

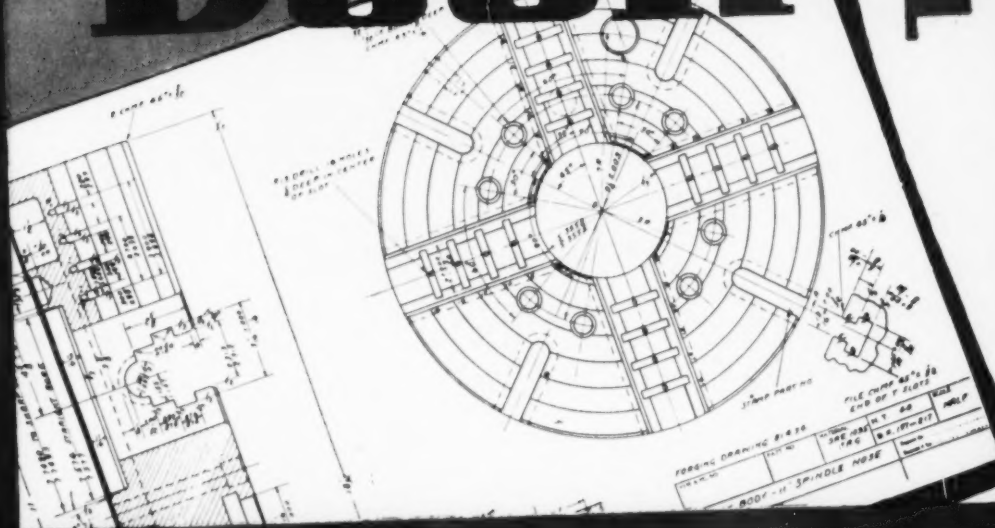
MACHINE

BLUE

ESTABLISHED 1906

BOOK

and TOOL



SEPTEMBER 1952

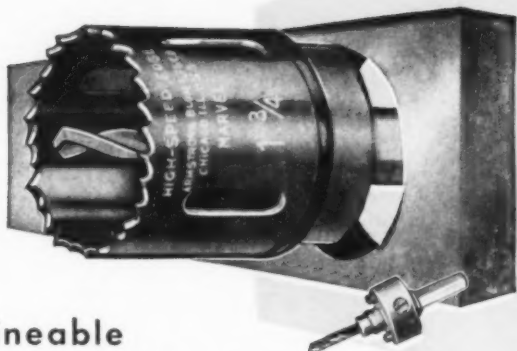
Use of carbides on cutting machines
Practical device may save time and money
Special report on drilling
Washington news letter

CONTENTS ON PAGE 5

Cut...

LARGE HOLES

... thru any machineable material up to 1 1/8 INCHES thick!



Here is a premium tool which makes it possible to saw holes in one short operation ... large holes which heretofore had to be laboriously machined "a-chip-at-a-time."



MARVEL High-Speed-Edge Hole Saws have strength to withstand the terrific peripheral strains of heavy duty operation in lathes, drill presses or portable power tools. They have a high speed steel cutting edge which is electrically welded to a tough, alloy steel body, high speed steel pilot drills, heavy hexagonal shank arbors and sufficient set for deep drilling. They are self-aligning, as the larger diameter saws float on their arbors and are driven by double drive pins. They will saw round holes accurately in any machineable material.

MARVEL High-Speed-Edge Hole Saws come in 35 sizes, from 3/8" to 4 1/2". They are carried in stock by leading industrial distributors.

WRITE FOR BULLETIN ST-49

"MARVEL" has Always had the edge!

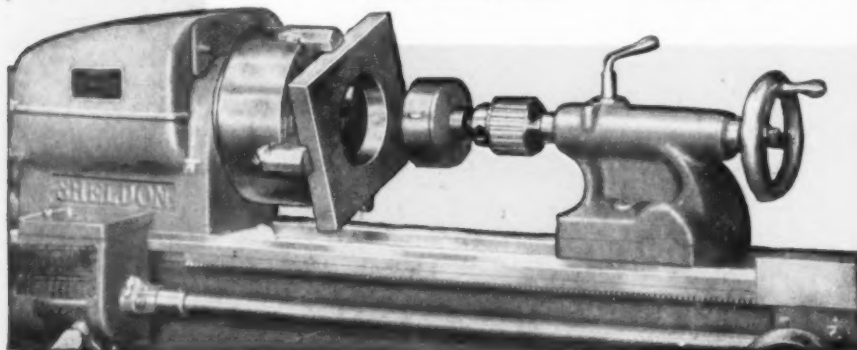


ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Avenue

Chicago 39, U. S. A.





*Eliminate
Work Transfers!
Cut Set-up Time
In Half!*

KNIGHT **NO. 50** FOR

VERTICAL MILLING & PRECISION BORING

More production—faster—with less labor and lower cost! This accurate, versatile and rugged solid-base No. 50 is now doing the work of 2 or more machines in hundreds of busy plants!

The No. 50 incorporates every essential feature for handling an extremely wide range of difficult boring and vertical milling jobs with production-line speed and toolroom precision. Time-wasting work transfers are completely eliminated—set-up time is reduced to half or less!

A powerful $7\frac{1}{2}$ H.P. all-gear motor provides power to spare for the toughest jobs. Convenient quick-action controls and full-vision work areas make operation easy and effortless.

- Table feeds, $5/16"$ to $20"$ per minute plus rapid traverse in all directions
- 16 spindle speeds, 40 to 2000 r.p.m.
- Boring feeds, infinitely variable, from .005" to .010"

—ATTACH TO COMPANY LETTERHEAD—

W. B. KNIGHT MACHINERY CO.
3922 W. Pine Blvd., St. Louis 8, Mo.

Send details on No. 50 and other Knight milling machines.

NAME

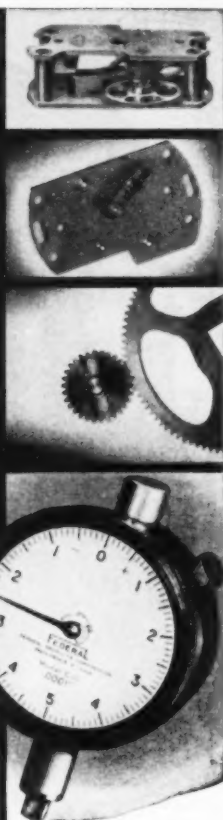
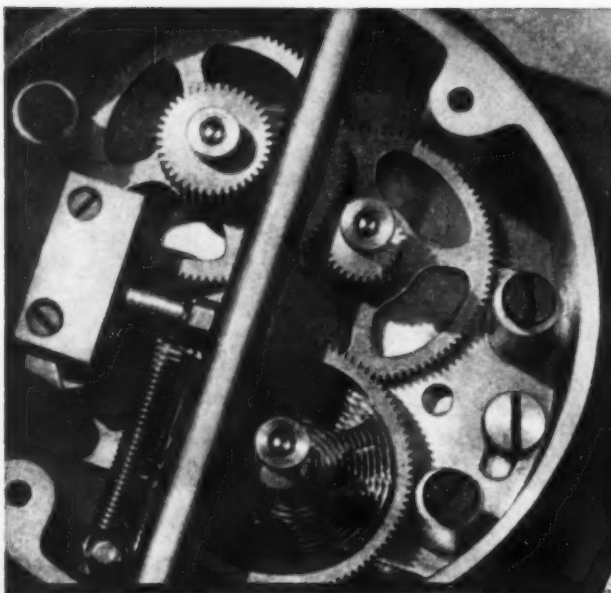
TITLE

- ☐ Send information on Knight 20" and 42" Power-Feed Rotary Tables

Mail Coupon For Details

W. B. KNIGHT MACHINERY CO.

3922 WEST PINE BOULEVARD • ST. LOUIS 8, MISSOURI



The Dial Indicator Built as Fine as the Finest Watch

Today the Dial Indicator is built mechanically as fine as the finest watch, for years the standard of comparison for fine manufactured articles.

The distance the contact point of a Dial Indicator moves must be accurately magnified by its rack and gears so that the amount of this distance will be accurately indicated by the dial graduations.

Gear teeth must be so designed and precisely cut they will magnify the movement of the contact point accurately and positively. All bearings and bushings must fit precisely so there is no lost motion and yet they cannot fit so tightly as to cause excessive friction. Inertia must be held to a minimum. All these details are necessary if a Dial Indicator is to be sensitive to slight dimensional variations.

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And, finally, a Dial Indicator must have the stamina and durability to withstand sudden shock and rough abuse.

We at Federal Products Corporation are constantly aware of the importance of these requirements. Federal leads in the development of Low-Friction, Low-Inertia, Full-Jeweled Indicators. Federal's top and bottom movement plate construction has long defied improvement and Indicator maintenance men prefer it to all others.

Send for Federal's latest catalog showing the most complete line of Dial Indicators and Indicating Gages. FEDERAL PRODUCTS CORPORATION, 1259 Eddy Street, Providence 1, Rhode Island.



**ABOVE ILLUSTRATIONS
(Top to Bottom)**

Note rigid assembly of top and bottom plates and massive support for pinion bearing — features which mean long lived accuracy.

Bottom plate of heavy page brass showing jeweled bearings and precision workmanship.

Teeth of gears and pinions are cleanly cut — not stamped — and they mesh accurately.

FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing all types of DIMENSIONAL INDICATING GAGES



Progressive

**SCREW MACHINE DEPARTMENTS
STANDARDIZE**

with

HARDINGE

**Collets - Feed Fingers - Pads
for**

**All Automatics, Turret Lathes,
Tool Room Lathes and Millers**



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PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

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Quality
TOOLS



*Not a cost, but an investment
that pays year after year*

Buy **ARMSTRONG TOOL HOLDERS** and **TOOLS** for today's job and they will bring you added profits thru the years. With **ARMSTRONG TOOL HOLDERS** you will be permanently tooling up for whatever comes, for each is a multi-purpose tool that takes cutter-bits ground to many shapes. Each is an efficient tool, refined thru a half century of world wide use. Each has strength beyond any need, extra strength resulting from endless research and the most modern closely controlled manufacturing methods.

ARMSTRONG TOOL HOLDERS are inexpensive too, for they are produced in great numbers. They are instantly available because they are carried in stock by all leading supply houses in sizes and types for every operation on lathes, planers, slitters and shapers; for standard operations on turret lathes and screw machines. They are profitable in use because they permit the highest speeds and heaviest feeds, and "Save: All Forging, 70% Grinding and 90% High Speed Steel."

ARMSTRONG Lathe and Milling Machine Dogs are permanent tools, too. They are drop-forged from special open hearth steels, are heat treated to extreme stiffness and toughness. They have alloy steel screws hardened at the tip to prevent up-setting and have double life, for hubs are made oversize to permit re-tapping.

ARMSTRONG Quality pays over and over again. Write for new S-48 catalog. It offers many opportunities to conserve profits.



ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5208 W. ARMSTRONG AVENUE • CHICAGO 30, ILL.

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Hitchcock district managers are listed on page 64

Accepted under section 34.64, P. L. & R., authorized office, Chicago, Ill.

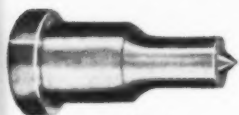
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Every Size for EVERY NEED!



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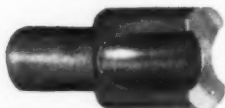
Taper Shank



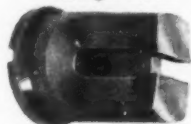
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Ripping Punch



Lattice Bar Punch



Tenon Punch

We stock about 400 sizes of the 21 Standard Round Cleveland Punches and matching Dies. When ordering these standard sizes you are assured of prompt delivery. Quantity stock production means a savings for you. When necessary, special sizes or shapes can be made to your specifications.

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A-511A

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U.S.A.
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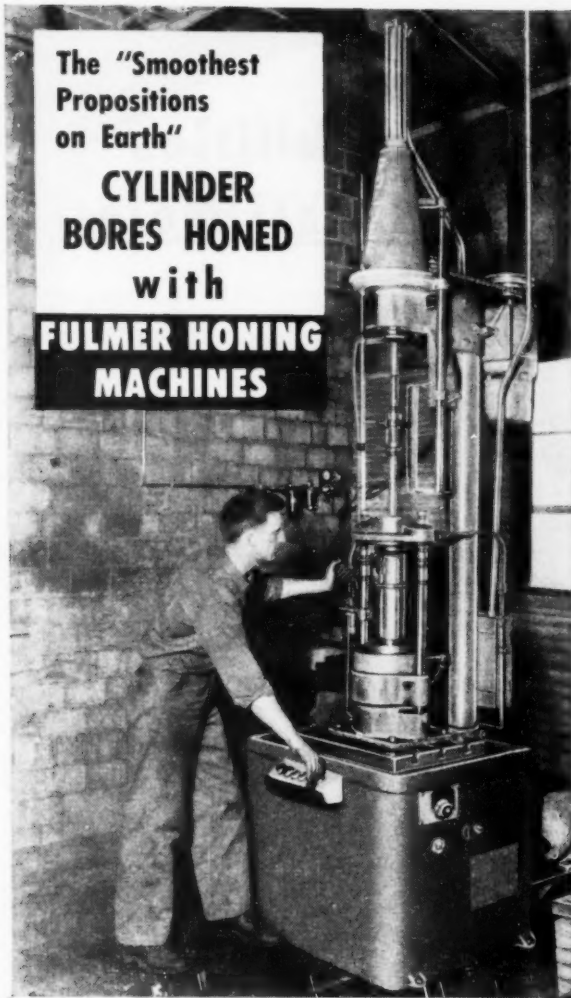
..... POWER PRESSES

FABRICATING TOOLS

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The "Smoothest
Propositions
on Earth"

**CYLINDER
BORES HONED
with
FULMER HONING
MACHINES**



EVEN so-called "smooth as a mirror" finishing is "rough stuff" compared to the **AMAZINGLY S-M-O-O-T-H AND STRAIGHT** bores of cylinders finished with

**FULMER
HONING
MACHINES**

TOLERANCES as close as .0001 (\pm). 15 sizes available for diameters from $\frac{1}{4}$ " to 30" and from 12" to 84" strokes.

FOR ferrous and non-ferrous metals, glass, plastic, etc.

Photo taken in plant of F. & F. Koenigkramer Co., Cincinnati, Ohio, showing honing bores of hydraulic cylinders.

**Write For Your
Copy:**

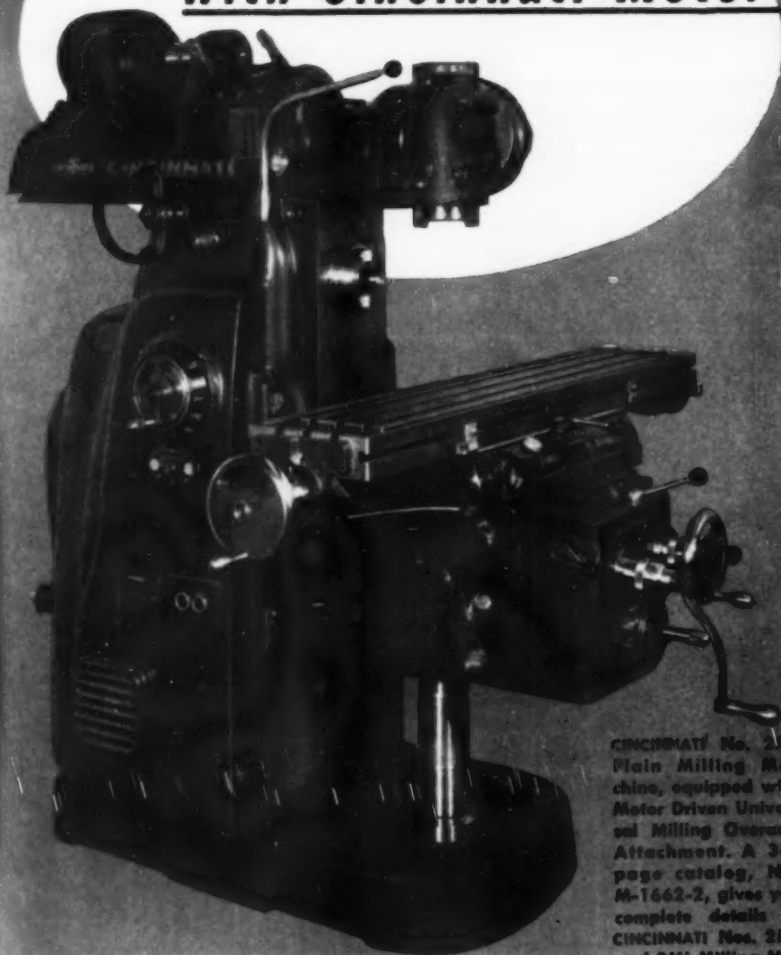
**"What To Know
About Honing"**

C. ALLEN FULMER CO.

1242 First National Bank Bldg.

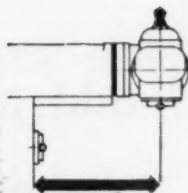
Cincinnati 2, Ohio

**Increasing
the job possibilities
*with Cincinnati Motor***



CINCINNATI No. 2MI Plain Milling Machine, equipped with Motor Driven Universal Milling Overrun Attachment. A 36-page catalog, No. M-1662-2, gives you complete details of CINCINNATI Nos. 2MI and 2MI Milling Machines.

These drawings illustrate how CINCINNATI Motor Driven Universal Milling Overarm Attachments increase the range and versatility of CINCINNATI knee-type milling machines. Complete information in publication No. M-1661-1.



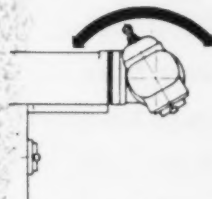
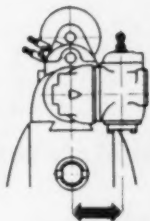
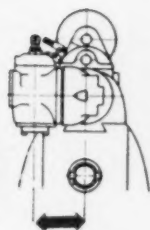
Driven Overarm Attachment

How many times have you needed a little extra range or extra versatility for a milling setup? Just think how much it would have saved! You can get all the extra range and versatility you will need on your CINCINNATI knee-type milling machines by equipping them with Motor Driven Overarm Attachments. ¶ Consider the CINCINNATI No. 2MI, for example. Of itself, it offers a host of advantages: convenient and easy speed change with one lever . . . a similar feature at the front of the knee for feed changes . . . 16 spindle speeds, 60 to 1 ratio . . . 16 feeds, 120 to 1 ratio . . . unit construction for low-cost maintenance. To these advantages and many others, add the extra range and versatility offered by the Motor Driven Overarm Attachment, and you have a toolroom miller that can handle any job. ¶ A few examples of the ways in which these self-contained attachments increase the job possibilities of CINCINNATI Milling Machines are illustrated here. There are two sizes, 2 hp for 2ML, 2MI and Dial Types; 5 hp for Dial Types and High Power and Dual Power Dial Types. You may obtain more information by writing for publication No. M-1661-1.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES
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add **HUNDREDS**
of productive hours
with
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BALAS also makes:

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You can actually add hundreds of productive hours by using Balas Master Collets, either Martin or "CB" type, since they permit rapid change over from one stock size or shape to another, merely by changing the pads without disturbing the setting of the collet.

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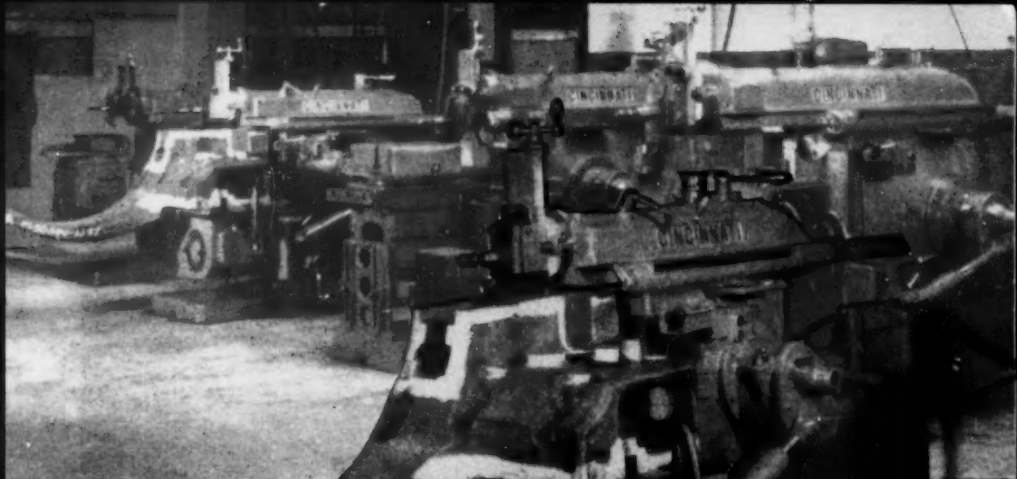
More and more concerns are experiencing unprecedented results with collets made by Balas. You, too, can profit from Balas Collet engineering...and the right time to start saving time with Balas Collets is now!

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WORLD'S LARGEST MANUFACTURER OF COLLETS EXCLUSIVELY

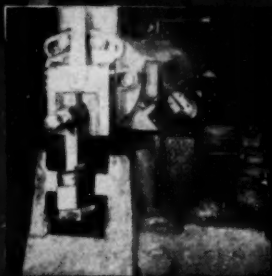


Photo—Arrow Metal Products Company

**small
investment—
BIG JOB**

Cincinnati Shapers can be profit builders for you. Write for Catalog N-5 for full information

**An unusual
undercutting
operation**



These large sidearms for stamping presses are machined on Cincinnati Shapers very profitably and efficiently, for two reasons—low investment and accurate, speedy performance.

This battery of rigid, powerful Cincinnati Shapers at Arrow Metal Products Co. is equipped with the Electro-Magnetic Clutch for speed and dependable operation. Modern controls are conveniently located for the operator, and also contribute to efficiency.

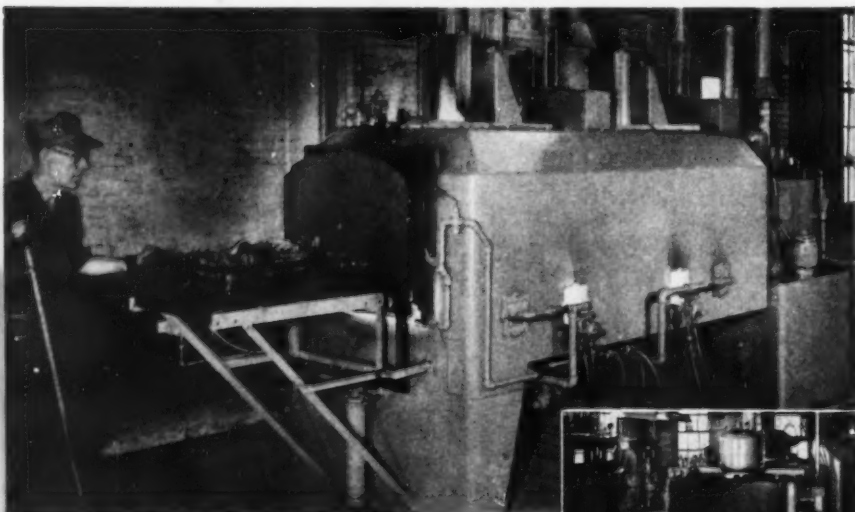
THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES



How 9 Operations are Eliminated



... with a New IPSEN HEAT TREATING UNIT

Clutch Parts Processed 2½ Times Faster

Here's how heat-treating the "Ipsenway" saves time and improves product quality for Rockford Clutch Division, Borg-Warner Corporation. Current records show a wide range of parts, now carbonitrided and quenched automatically in this new Ipsen T-600 double hearth unit, are handled up to 2-1/2 times faster than previous methods.

Distortion Controlled to Within .003"

For example, S.A.E. 1010 Steel Drive Plate Retainers are now processed automatically at a rate of 8,000 pieces per 8-hour day. Previously, with a cyaniding process, production averaged 3200 per day. *Nine individual operations are eliminated*, the workpieces come out bright, are scale-free and rust resistant. In addition, a highly uniform case depth is maintained, and distortion is held to within .002 - .003".



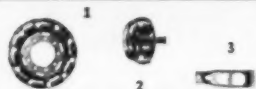
Write FOR MORE FACTS TODAY

Find out how Ipsen Units can be applied to your work. Ask for **FREE Data Sheets**... covering operating facts on actual jobs.

IPSEN INDUSTRIES, INC., 719½ South Main Street, Rockford, Illinois
Production units for CARBONITRIDING · CARBURIZING · HARDENING · BRAZING · MARTEMPING



Unloading End of Ipsen T-400 Heat-Treating Unit. Temperature and atmosphere control instruments and generator are shown in the background.



TYPICAL JOB RESULTS

1 Outer Retainer Plate — SAE 1010, carbonitrided .004", 400 per heat, 70 minute cycle. Fixturing, pickling, washing, rust-proofing, and four loading and unloading operations eliminated.

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- for SPEED
- for ACCURACY
- for VERSATILITY
- for ADAPTABILITY
- for MAINTENANCE

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by
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MACHINE FOR INDUSTRIAL USE

AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS



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TOOLS

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and DIES • ROTARY FILES
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REAMERS and MILLS • DRILLS
BORING BITS**

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TORQMATICS, when used with Jarvis TAPS, make the finest possible combination for low-cost, high-quality tapping. Send for free, illustrated, descriptive literature to The Charles L. Jarvis Company, Middletown, Conn.

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT



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are "Everybody's Favorite"

Manhattan Portable Wheels are the favorite with workers on incentive pay because they remove metal faster, resulting in more pieces done per shift. Management men, too, like Manhattan wheels because they do a quality production job at lower cost.

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MR-826R



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benefits of **a personalized steel service.**



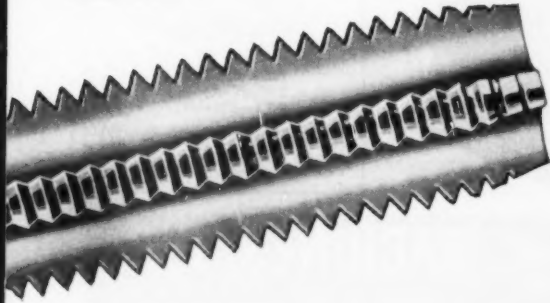
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UNITED STATES STEEL

SHIRAZ





Stay out of production "tie-ups" . . . keep your schedules "on the go" with BATH ground from the solid TAPS!

Of this you can be SURE . . . Bath Ground Thread Taps are made to give longer tap life — are accurately ground for high speed thread cutting efficiency and uniform performance.

Modern equipment is used for heat treating . . . for flute milling and grinding . . . for all steps of manufacture — to final 100% inspection. This constant check assures maintenance of BATH quality-control standards in factory procedure.

Perhaps BATH engineers can help give you the "green light" on some particular threading problem that is holding up your production speed and scheduled deliveries. The benefit of years of experience and research is yours for the asking.

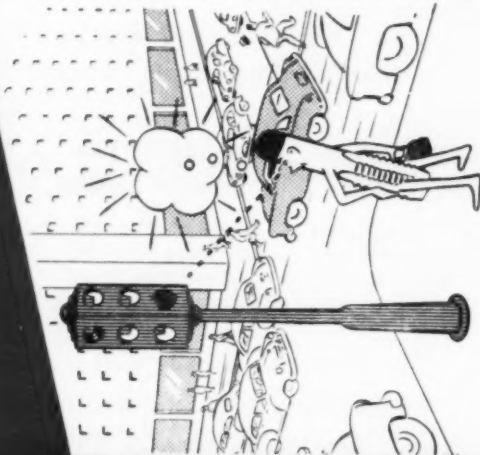
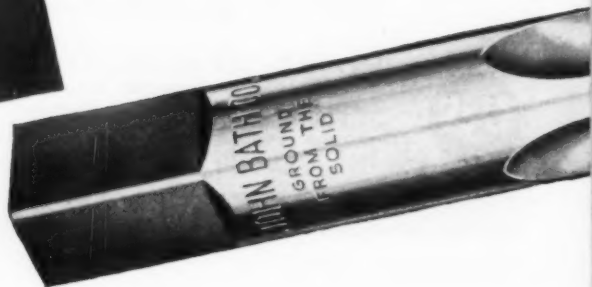
INSIST ON BATH TAPS
— PROFIT BY THEIR
PLUS — PERFORMANCE



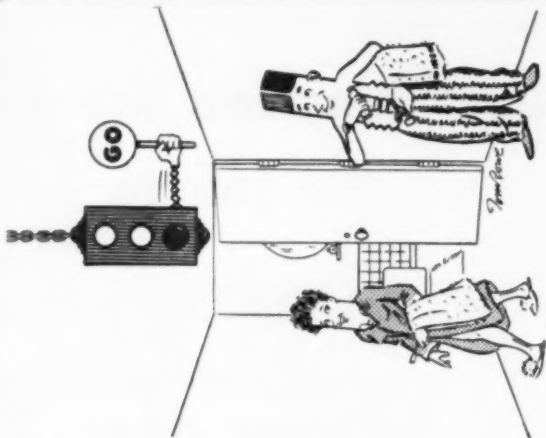
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JOHN BATH CO. INCORPORATED
14 Grafton St., Worcester, Mass.

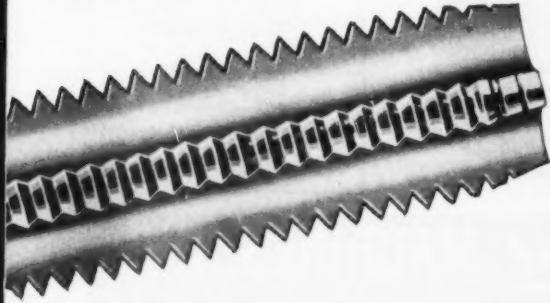
TAP-ODDITIES



Pete says — "a traffic signal
Gives everyone a break.
Each morning when I "gotta-go" —
What a difference it would make!"



Now, bathroom rush-hour traffic,
On schedule must behave.
Pete's daughter gets 3 minutes
And Pete . . . a chance to shave!



Stay out of production "tie-ups" . . . keep your schedules "on the go" with BATH ground from the solid TAPS!

Of this you can be SURE . . . Bath Ground Thread Taps are made to give longer tap life — are accurately ground for high speed thread cutting efficiency and uniform performance.

Modern equipment is used for heat treating . . . for flute milling and grinding . . . for all steps of manufacture — to final 100% inspection. This constant check assures maintenance of BATH quality-control standards in factory procedure.

Perhaps BATH engineers can help give you the "green light" on some particular threading problem that is holding up your production speed and scheduled deliveries. The benefit of years of experience and research is yours for the asking.

INSIST ON BATH TAPS
— PROFIT BY THEIR
PLUS—PERFORMANCE



PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

JOHN BATH CO. INCORPORATED
14 Grafton St., Worcester, Mass.

**When you're looking for a machine that will
MILL, DRILL, BORE and SHAPE
AT ALL ANGLES WITHOUT CHANGING SET UP**

You're looking for the

Bridgeport

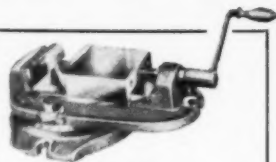
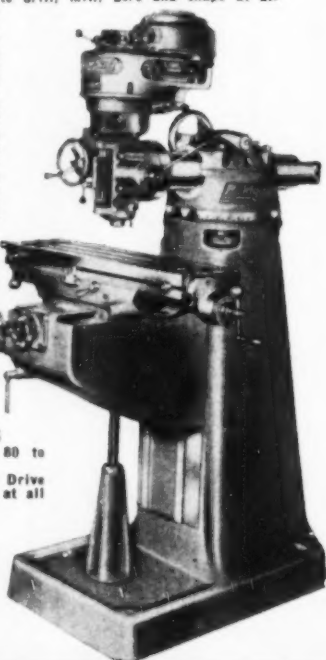
Turret Milling Machine

Here is a machine that die shops, tool rooms and production lines are keeping busy every day, saving time, conserving effort in handling countless jobs of all kinds in a way that the "BRIDGEPORT" and only the "BRIDGEPORT" makes possible.

The exclusive features of "BRIDGEPORT" performance are recognized and accepted wherever there are metal working shops. That is why countless thousands of these machines are modernizing methods in tool rooms, die shops and production lines. Obviously, ability to drill, mill, bore and shape at all angles of the work without changing set up results in maximum machine time, minimum down time, and maintained accuracy through every operation. Modernization of your methods through installation of "BRIDGEPORTS" pays off quickly because the "Bridgeport" price is low while returns on the investment are exceptionally high. It will be to your advantage to get complete information . . . NOW!

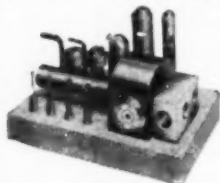
CONDENSED SPECIFICATIONS

8 Spindle Speeds from 80 to 2720 R.P.M.
Back Geared Spindle Drive Unit: utilizes full power at all speeds without belt slippage.
Quill Travel: 5"
Power Feed Quill in three steps: .0015, .003 and .006 in. per spindle revolution.
Spindle Brake and Lock for convenience in changing tools.
Collet Capacity: up to 3/4" diam.



**MILLING
MACHINE VISE**

An improved vise providing great gripping power. Streamlined for attractive appearance and equipped with coolant trough. Rigid holding through screw of large diameter. Made in two sizes: 5" x 3 1/2" and 6" x 5" jaw openings.



**NO. 2
BORING HEAD**

Boring Tools and Holder provide the means of boring holes up to 6" diameter. Available for use on Bridgeport 1HP Milling, Drilling and Boring Attachment.



**NO. 3
HEAVY DUTY
RIGHT-ANGLE
ATTACHMENT**

For milling and drilling at right angles. Used also for boring and reaming, cutting gears, hobs and broaches, sawing and slitting.

***Bridgeport* MACHINES, INC.**

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines



MORE THAN 300 PARTS ARE MACHINED with the aid of one cutting oil for tools and hardware items made by Sargent & Co. Raw materials worked are: B1113 steel, 11ST-3 aluminum, ASTM-B140-46 Type B half-hard bronze, B16-16 brass, and Type 416 stainless steel. Stock ranges from $\frac{1}{16}$ " wire to 2" bars.

SINGLE GRADE OF SUNICUT REPLACES 4 CUTTING OILS

A good example of cutting-oil economy and efficiency is provided by Sargent & Co., well-known hardware and tool manufacturers. Their complete line requires the machining of more than 300 parts from a wide range of metals. A few years ago this company was using four different cutting oils, purchased in drums. By switching to a single product, Sunicut 11W, and buying it in bulk, Sargent has been able to effect an annual saving of about \$3,000. All operations are performed as well as before, or better—and shop efficiency is up.

Sunicut 11W is a low-viscosity, dual-purpose cutting oil for automatics machining all nonferrous metals and free-machining steels such as B1112 or B1113. Its transparency permits quick and accurate miking. It will not stain brass or copper under normal conditions. It drains rapidly, minimizing carry-off. And its high lubricating and cooling properties aid in prolonging tool life and improving finishes. Moreover, it protects finished parts from rust and corrosion.

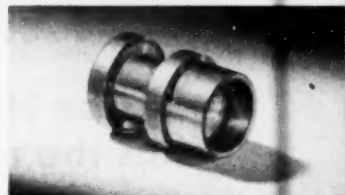
Other Sun cutting oils offer similar opportunities for improved operations and economy. For information about them, or the help of a Sun representative, use the coupon at the right.

SUN INDUSTRIAL PRODUCTS

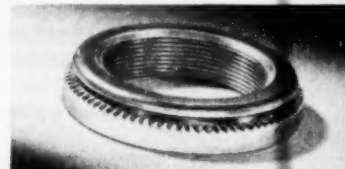
Sun Oil Company, Phila. 3, Pa. • Sun Oil Company, Ltd., Toronto & Montreal



LOCK CYLINDER. Metal: $1\frac{1}{8}$ " dia. brass • Machine: model 601 New Britain Gridley • Operations: cross slide—rough form, finish form, break down, cut off, side mill, vertical end mill, final cut off; tool slide—face, drill offset hole, ream and counterbore offset hole, thread • Spindle Speed: 1,324 rpm • Feed: .006" per revolution • Tools: high-speed steel • Cycle Time: 7.3 seconds



CARPENTER'S PLANE PART. Metal: $\frac{5}{16}$ " B1113 steel • Machine: Brown & Sharp Automatic Screw Machine • Operations: front cross slide—form; rear cross slide—cut off; turret—feed stock, spot drill, drill $1\frac{1}{2}$ " hole, tap drill, reverse spindle and tap left-hand thread • Spindle Speed: 1,180 rpm • Feed: .0025" per revolution • Tools: high-speed steel • Cycle Time: 30 seconds



KNOB INSERT. Metal: $1\frac{1}{4}$ " round aluminum • Machine: model 61 $1\frac{1}{2}$ " New Britain Gridley • Operations: cross slide—form, knurl, cut off; tool slide—spot drill, tap, ream, recess • Spindle Speed: 1,600 rpm • Feed: .005" per revolution • Tools: high-speed steel • Cycle Time: 7 seconds

SUN OIL COMPANY, Dept. MT-9 Philadelphia 3, Pa.

I am having trouble possibly caused by an inadequate cutting oil. I would like ☐ the services of a Sun representative; ☐ the booklet "Cutting and Grinding Facts."

Name _____
Title _____
Company _____
Street _____
City _____ Zone _____ State _____

In grinding ...
*you get
 the most
 from Norton*

**because Norton
 has the most
 to offer you**

Only Norton offers you such long experience in both grinding wheels and machines to help you produce more at lower costs.

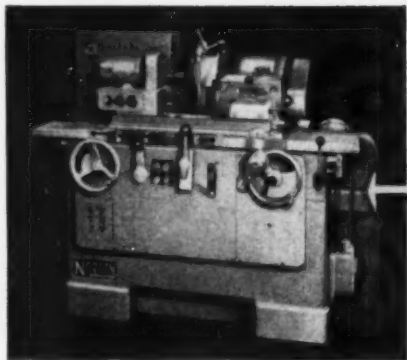
Take advantage of this experience. Discuss with us your present grinding problems or your post-emergency production to fit tentative delivery schedules into your future plans.

**To Economize, Modernize
 With NEW**

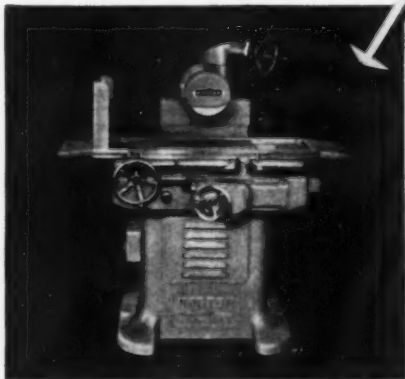


**GRINDERS
 and LAPPERS**

*Making better products
 to make other products better*



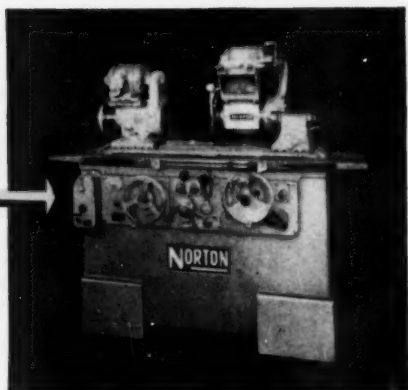
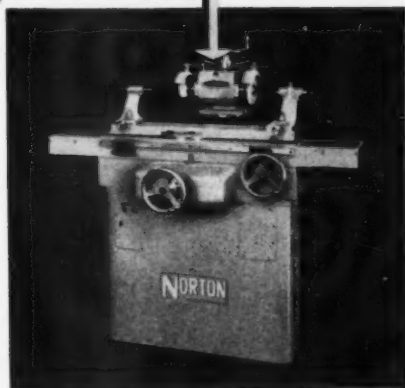
NEW NORTON 4" TYPE CTU Semiautomatic, in 12" and 18" work-length capacities. Like the larger CTU's, it offers speed, accuracy, flexibility and sturdiness. All Norton CTU Semiautomatics have "one lever" control of automatic time cycle which reduces operator attention merely to loading and unloading. *Catalog No. 531 gives you all details.*



NORTON HYDRAULIC SURFACE GRINDERS, with both hand and hydraulic table traverse and cross feed, produce plane surfaces smoothly and speedily. Convenient controls and easy accessibility keep operating and maintenance time low. Extras include permanent magnet or direct current type chuck, wet grinding attachment or individual dust exhaust system. Three sizes: 6", 8", and 10". Write for Catalogs 954 (6"); 190 (8") and 1745 (10").

Norton Grinders and Lappers

*The world's
most complete line*



NORTON UNIVERSAL GRINDERS handle an endless variety of jobs. Compound swivel arrangement allows you to set and feed the wheel at any angle. External, internal, face or angular wheelslide operations come easy. Four sizes: 10"x20" and 12", 14", or 16", each with work-length capacities of 36", 48" or 72". Write for Catalogs 170 (10"x20") and 1668 (12", 14", 16").

NORTON NO. 20 CUTTER AND TOOL GRINDER, with its tilting wheel head, is the most versatile machine in its class. Wheel head tilts 15° above or below horizontal... may be swivelled 360° in a horizontal plane. Integral motor cartridge type spindle, duplicate controls for front or either-side operation are additional "plus" features. Write for Catalog 189.

**ONLY NORTON OFFERS YOU
OVER 50 YEARS OF COMBINED EXPERIENCE IN:**

**Abrasives
and
Grinding Wheels**



Machines for Cylindrical Grinding • Surface Grinding • Cylindrical and Flat Lapping • Universal Tool and Cutter Grinding • Universal Multipurpose Grinding • Specialized Grinding • Crankshaft Grinding • Cam Shaft and Contour Grinding • Roll Grinding

NORTON COMPANY • MACHINE DIVISION • WORCESTER 6, MASS.

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5

NEW PROCUNIER TAPPERS

Work **FASTER**

Last **LONGER**

...and save Taps too!

Procunier Tapping equipment is the answer to today's pressing need for tapping equipment that will meet current high-speed production demands and at the same time reduce maintenance and operating costs. Developed by practical craftsmen—who have concentrated exclusively on developing, improving and perfecting tappers for more than 30 years—Procunier tappers offer the rare combination of high speed, dependable accuracy, lasting endurance and economy of operation. Special exclusive construction features enable them to cut threads **faster, for longer periods**—with fewer spoiled pieces, fewer rejects. Here's why:

1. **Tap breakage is practically eliminated** due to the high sensitivity of the new Procunier cork-faced friction clutch which automatically regulates driving pressure. Thus, even "green" operators can quickly detect dull or loaded taps by the "feel" or pressure on the clutch.
2. **Strain and wear are minimized** and torsion eliminated thru special gear reversing mechanism which distributes pull thru three intermediate gears.
3. Chuck spindle is supported at both ends assuring true operation—**avoiding tap wobble**.
4. **Aluminum housings** assure greater strength and rigidity with minimum weight—a vital factor for high speed tapping.
5. **PLUS** many other exclusive features.

WRITE TODAY for more complete details and specifications on the complete line of Procunier Tapping Heads and see why Procunier offers the "finest in tapping equipment."

PROCUNIER SAFETY CHUCK CO.
14 S. Clinton St., Chicago 6, Ill. Dept. 9
Gentlemen:

Please send your illustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

Name

Address

City Zone State



with the
NEW
"TRU-GRIP"
Tap Holder

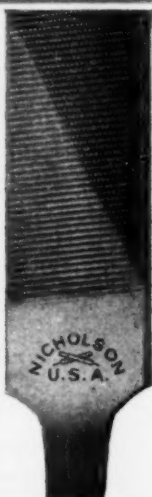
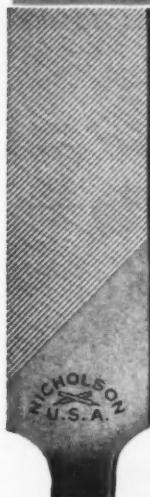
The exclusive Procunier "Tru-Grip" tap holder is lighter, smaller in diameter. It affords easier tapping close to walls or shoulders, eliminate "chewed" tap shanks. Holds tap true.

Procunier

SAFETY CHUCK CO.

14 SO. CLINTON ST. CHICAGO 6, ILL.

American Optical SPEEDS PRODUCTION with "The right file for the job"



LATHE FILING (upper) finishing part of Micro-Surfacers with the Nicholson Long Angle Lathe File (left). Long angle of teeth "slides" chips down and out—minimum filing up and scratching work.

REMOVING BURRS (lower) from brass lens-coating plate with the Nicholson Bram File (right). Special tooth construction breaks up filings and prevents file from running off the work.

American Optical Company's recently developed Universal Micro-Surfacers offers new heights of accuracy and speed in the production of prescription optical lenses.

Properly shaped, accurately cut, uniformly hardened Regular and Special Purpose files are necessary for many of the hand finishing and fitting operations involved in its construction and that of other American Optical products.

Does the manufacture of *your* products call for fast or precision filing — on brass, aluminum, babbitt, plastics, stainless steel, die or foundry castings,

lathe work? Nicholson has *The right file for the job*, in the highest quality.

Sold through Industrial Distributors

FREE TECHNICAL BULLETIN on "TEN SPECIAL FILE TYPES."

NICHOLSON FILE COMPANY
16 Acorn Street
Providence 1, R. I.
(In Canada, Port Hope, Ont.)



NICHOLSON

...a file for every purpose



PATENT PENDING
Type 10 TD

(Right) Mounting a new wheel in 5 minutes!

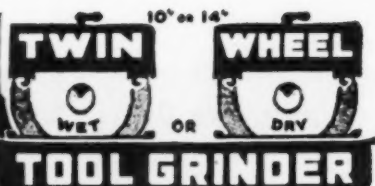
(Right) Operating view of 10 TD shows ample room to comfortably serve two operators. (Twin lights are optional.) Complete operator comfort when grinding wet. Absolutely no spray or splash.



UNIVERSAL PRECISION
PROTRACTOR — TOOL
GUIDE with DRESSER
grind any size tool
for any desired angle.

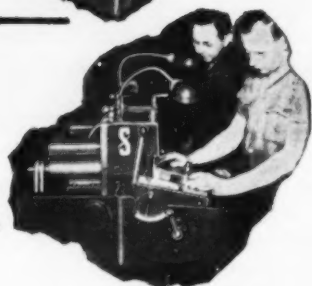
WRITE FOR BULLETIN TW

PROMPT DELIVERY



FOR CARBIDE, STELLITE OR
HIGH SPEED STEEL TOOLS

*one step
from rough
to finish grind*



THE STANDARD
ELECTRICAL TOOL CO.
2486 RIVER ROAD
CINCINNATI 4, OHIO

See us at the National Metal Exposition,
Philadelphia, Pa., Oct. 20-24,
Space No. 908.

WESSON METAL IS PRODUCING

MANY MORE "CONTROLLED" LOTS
OF WESSONMETAL

**TO MEET THE EVER INCREASING
DEMAND FOR THIS
IMPROVED CARBIDE!**



WESSONMETAL

- ★ Solid Carbide Blades
- ★ Standard and Special Carbide Tips
- ★ Solid Carbide Shapes

**6 STANDARD GRADES . . . 2 SPECIAL GRADES
TO MEET HIGH SPEED AND HIGH FEED RATES
OF MODERN MACHINE TOOLS**

Uniform dependability is maintained in Wessonmetal because it is quality controlled by Wesson's exclusive method of small lot production. Each lot is carefully processed—rigidly inspected to maintain uniformity—highest possible quality. Whatever your needs in Solid Carbide—you can depend on Wessonmetal for Quality, Economy and Efficiency.

Write for Bulletin

WESSON METAL CORPORATION

Lexington, Kentucky

Affiliated with WESSON COMPANY

PIONEERS
IN THE ART OF
DESIGNING
AND
PRODUCING
CARBIDE TOOLS

CUT COSTS WITH MULTIPLE BENDING

Whether you're bending pipes, tubes, reinforcing bars or structural shapes, you can greatly increase your bending production by multiple die bending.

Shown here is our Model A-5 BENDING MACHINE tooled for bending 3 different radii without changing the set-up. In order to make multiple bending cost no more per die than single bending, individual dies are merely stacked on the die spindle and a shoe of the proper width permits the same degree to be bent without changing the automatic reset switch. The MODEL A-5 will bend pipe up to and including 2" standard weight pipe.



Redesigned and greatly improved, the Model A-5 still sells for only \$1975. F.O.B. factory, U.S. Funds.

Smaller and larger machines available.

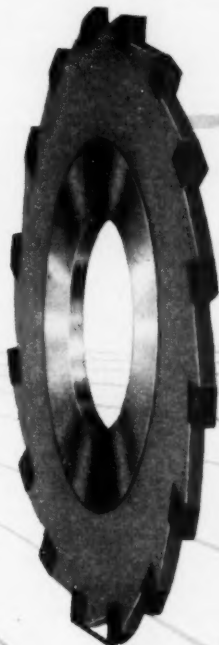
Write for detailed and descriptive folder.

PEDRICK TOOL & MACHINE CO.

3640 N. LAWRENCE ST.

DEPT. 3

PHILADELPHIA 40, PA., U.S.A.



REPUTATION

At Circle R, we have a heavy investment in reputation. Since 1923, the reputation of our product has become entrenched — because ever since this company was established we have produced only the best. Far from resting on our prestige, we are committed to progressive policies — as if we had our reputation still to win.

Reputation guarantees our circular cutting tools to be of highest quality. You'll find them also the most efficient and economical you can buy.

METAL SLITTING SAWS
SCREW SLOTTING SAWS
COPPER SLITTING SAWS
COMMUTATOR SLOTTING SAWS
JEWELER'S SLOTTING SAWS
TUBE CUT-OFF SAWS
SLITTING DISCS • SOLID &
TIPPED TUNGSTEN CARBIDE
SAWS • COMBINED DRILLS,
COUNTERSINKS & CENTER
REAMERS

CIRCULAR TOOL CO., INC.

PROVIDENCE 5, RHODE ISLAND

Chicago • Cleveland • Dayton • Detroit • Burbank
Milwaukee • New York City • Indianapolis • Pittsburgh
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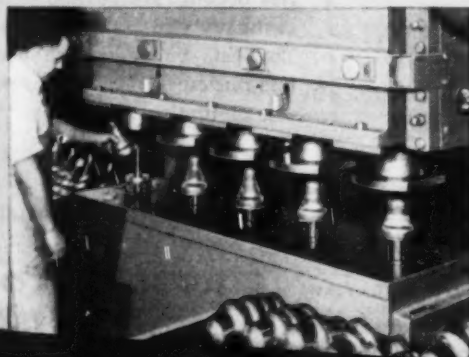
NIAGARA

SERIES B GAP FRAME Double Crank Presses

Niagara B-4 x 72 Press at the General Machine Works in Los Angeles. It is shown here fitted with two dies for forming operations on an automatic deflector.



The same press as shown above arranged with dies for redrawing projectile parts in 5 steps. Shells are transferred manually from die to die.



NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

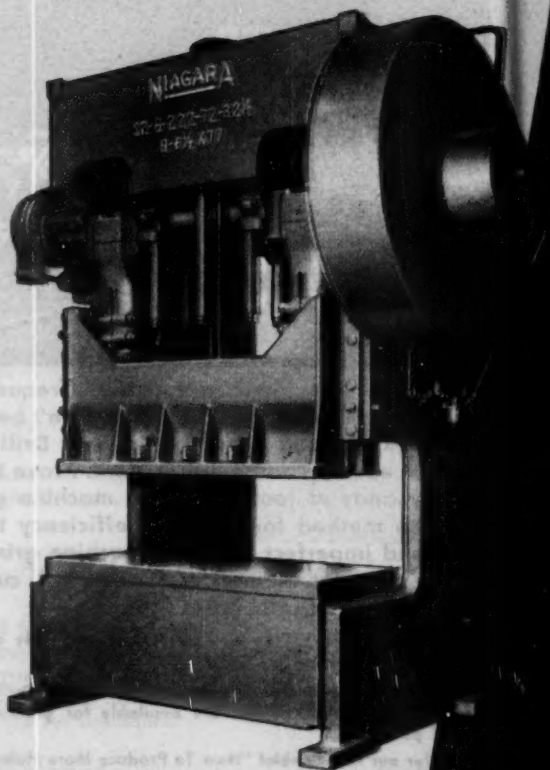
* Manufacturers of a complete line of sheet metal working equipment ranging from small hand tools up to large power operated machinery.

Versatility and High Production

- Gap frame convenience with double crank width.
- Ideal for long progressive dies or multi-station dies.
- Rear of press open for full accessibility.
- One piece welded steel frame for maximum rigidity and long die life.
- Exclusive Niagara Sleeve Clutches for maximum productive strokes per minute and minimum maintenance cost.
- Niagara cushions for drawing operations.
- Automatic feeds for high production jobs.

Write for Bulletin

Niagara B-6½ x 77 Gap Frame Double Crank Press. Air actuated, electrically controlled sleeve clutch with friction clutch convenience and sleeve clutch economy. Air releasing brake. Clutch and gearing operating in a bath of oil. Air counterbalance for slide with surge tank over-size cylinder and pressure regulating valve to compensate for various weights of dies. Cross bar knockout in slide. V-belt motor drive.



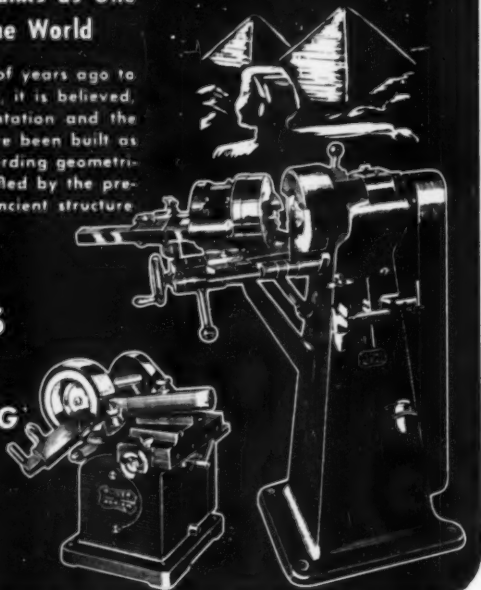
DISTRICT OFFICES: NEW YORK • CLEVELAND • DETROIT • PHILADELPHIA

FAMED for PRECISION

The Great Pyramid of Gizeh Ranks as One
of the Seven Wonders of the World

Built by unknown engineers thousands of years ago to cover the Tomb of the Pharaoh Cheops, it is believed, that through the exactness of its orientation and the preciseness of its measurements, to have been built as an astronomical observatory or for recording geometrical facts. Modern scientists are still baffled by the precision of the techniques used in this ancient structure.

**OLIVER
DRILL POINTERS
ARE FAMED FOR
PRECISION SHARPENING**



Production slowdowns are costly—frequently they are caused by improper grinding of the drill points. Don't be baffled by these costly delays—they can be eliminated with Oliver Drill Pointers which give balanced cut with each lip doing equal work. Prove to yourself as has been proved in thousands of toolrooms that machine grinding is the best and most accurate method for restoring efficiency to drills. Avoid excessive drill costs and imperfect holes by machine grinding on Oliver Drill Pointers. With the Oliver Method your drills will cut faster, last longer, and produce more accurate holes.

No. 310 for drills $\frac{1}{4}$ " to 3"—2-3-4 flute. Variable clearances. Variable point angles. Full automatic operation.

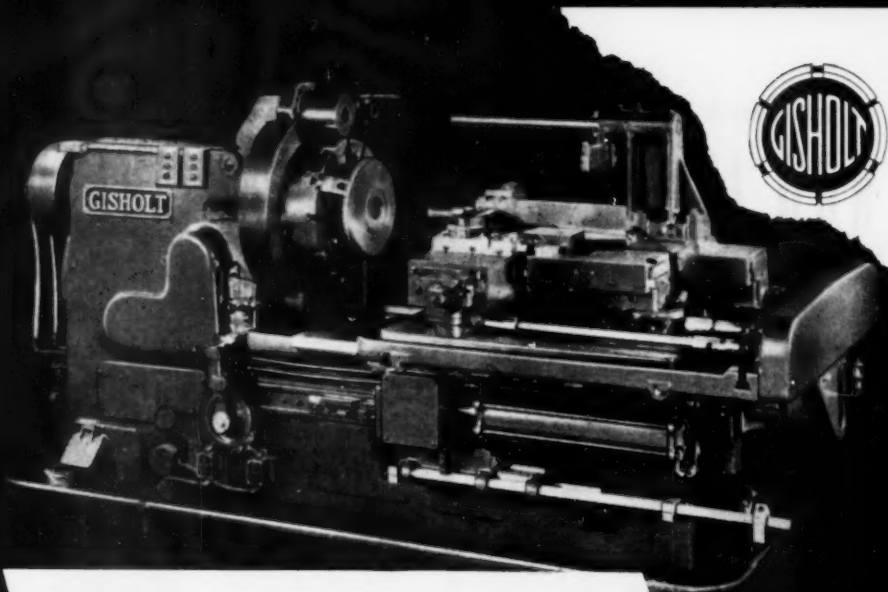
No. 21 Oliver Bench Grinder. Hand operated for Drills No. 57 to $\frac{1}{2}$ ". Right hand, with an improved point. Attachments are available for grinding oil hole drills, left hand and other special points.

Write for our free Booklet "How To Produce More Holes With Your Drills!"

OLIVER INSTRUMENT CO.

1408 E. MAUMEE • ADRIAN, MICHIGAN

AUTOMATIC DRILL GRINDER
TOOL & CUTTER GRINDERS—DELL
POINT, THINNERS—TEMPLATE
TOOL GRINDERS—FACE MILL
GRINDERS—DEMAKING MACHINES

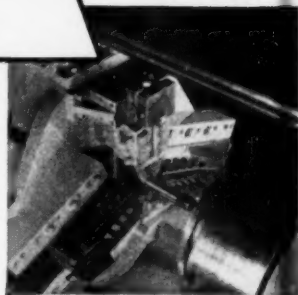


SIMPLE is the word for the **SIMPLIMATIC!**

Wherever you have a sufficient run of similar parts, the Simplimatic Automatic Lathe can solve several of your problems at once.

1. High speed production assures larger output at lower cost per piece.
2. The wide variety of tool arrangements on the large, flat table of the *Platen Type Simplimatic* (shown above) makes it adaptable to a wide range of work.
3. Training time is reduced to a minimum because the entire machining cycle is completely automatic. One operator normally runs several Simplimatics.

The extreme flexibility of the standard Simplimatic can frequently give you all the advantages of a machine designed especially for your job. If you want simple, quick, lower cost production, this is a good time to investigate the Gisholt Simplimatics. Ask for literature.



The Radial Type Simplimatic is ideal for machining flywheels, etc., with wide faces and multiple inside and outside diameters. Extreme rigidity permits multiple tooling and maximum cutting speeds, sustained accuracy and excellent life of cutting tools.



THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

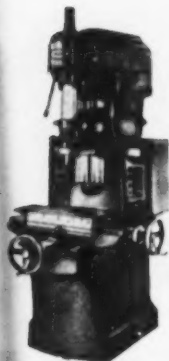
GISHOLT

COMPANY

Madison 10, Wisconsin

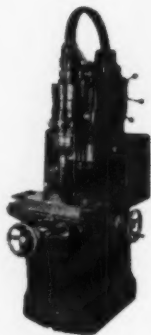
TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

NOW IS THE TIME TO PLAN AHEAD



No. 3 MOORE JIG BORER, with its accurate lead screw settings within .0001", offers all the time-proven precision features associated with Moore Jig Borer construction for 15 years, plus numerous labor-saving advantages, including: increased capacity and size; infinitely variable spindle speeds; 3 power feed ratios; centralized controls.

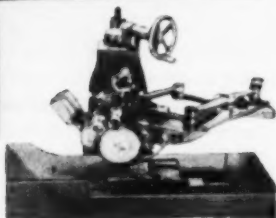
No. 3 MOORE JIG GRINDER. With this new and larger Moore Jig Grinder, regular and irregular contours are ground to size and location after hardening. This extends the Jig Grinder's traditional function of re-locating straight and tapered holes. Holes from $\frac{1}{64}$ " to 8" can be relocated and ground within .0001"—by power or hand feed.



Four ways to
cut costs and
meet competition
by mechanizing
your toolroom.



No. 1 MOORE JIG BORER remains in the line. For its range—table working surface of 10" by 16" and cuts up to $3\frac{1}{2}$ "—this machine is still an ideal buy. There are over 1000 satisfied users. We will continue to offer it for the many situations where a small, accurate jig borer fills the required prescription.



MOORE PANTO-CRUSH WHEEL DRESSER speeds form-grinding and cuts costs. Both crush-forming and diamond-dressing are accomplished with this 2-in-1 unit permanently mounted on the wheel spindle of a surface grinder. You switch from one method to the other without disturbing workpiece setting.

We'll be glad to send you complete descriptive literature on any of these machines.

MOORE SPECIAL TOOL COMPANY, INC.
728 Union Ave., Bridgeport 7, Connecticut

ADD TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES

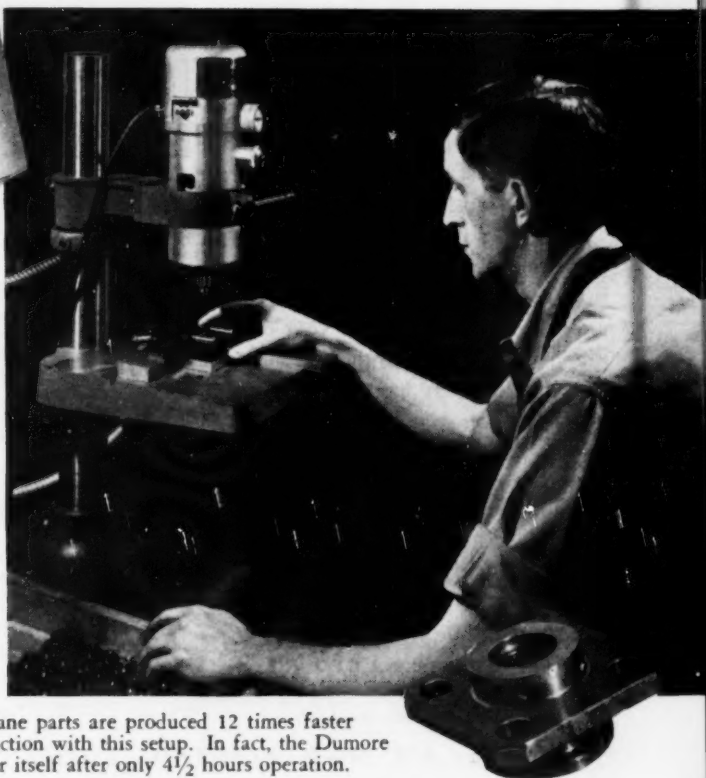
NOW, DUMORE DRILL HEAD makes every drill operator an expert!



THE new Dumore Automatic Drill Head does away with operator guesswork — the new *resistance drilling* way. *High drill breakage losses are virtually eliminated by this remarkable new tool.* It produces premium quality, small diameter deep holes, even with unskilled labor. And shop foremen report average drill life increases as much as 93 per cent.

Dumore's new *resistance drilling* automatically equalizes the *exact* pressure required for every stroke of the drill head...automatically compensates for variations in drill quality and workpiece hardness...factors your drill operators can't compensate for by sense of touch alone.

Get all of the advantages of this remarkable shop tool. Ask your nearby industrial distributor for a demonstration, or write the Dumore Company.



Holes for airplane parts are produced 12 times faster at a 97% cost reduction with this setup. In fact, the Dumore Drill Head paid for itself after only 4½ hours operation.

THE DUMORE COMPANY 1335 Seventeenth Street • Racine, Wis.

"...because Buckeye Tools stand up better"

A West Coast manufacturer of truck and bus engines buys portable air tools solely on the basis of performance—and uses Buckeye wrenches, grinders and drills in production and assembly work. In placing a recent order for Buckeye drills, the plant engineer said, "We use a lot of air tools here and have found over a period of years that Buckeye tools give us less trouble and stand up better."

Buying air tools on the basis of performance alone is simply good business — particularly when you can test Buckeye tools in your own plant, on your job, without obligation. Write today for your copy of our Air Tools catalog—and start now to save time and money with Buckeye tools.



Buckeye "B" Series grinder removing burrs from flywheel housing for bus engine.



Running in cap screws on a truck engine takes less time with this Buckeye "B" Series wrench. Buckeye "C" Series right angle wrenches are also used for this type of work.

Buckeye Tools

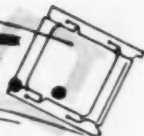
CORPORATION

DIVISION 14 • DAYTON 1, OHIO

IN CANADA: Joy Manufacturing Co. (Canada)
Ltd., Galt, Ontario

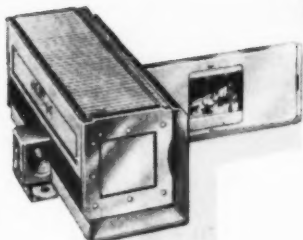
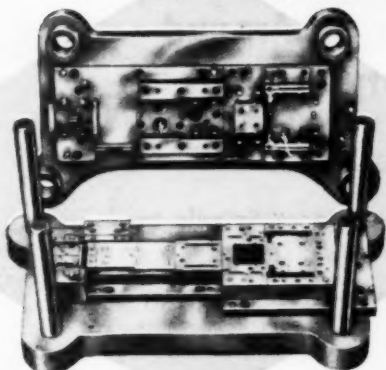
PORTABLE AIR AND ELECTRIC TOOLS FOR INDUSTRY

200 frames a minute.



on **PRODUCTO**

DIE SET



PERFORMANCE

12,000 pieces produced per hour
Over 2 million pieces produced between grinds
Continuous operation for 20 months

EQUIPMENT

Die: six-station (piercing, forming, cut-off)
Die Set: Producto special four-pin
Feed: special high-speed automatic

SPECIFICATIONS

Frame Size: 2.157 inches by 2.020 inches
Tolerances: plus .000 inch minus .005 inch
Material: .010 inch thick 52 S-H38 aluminum

**Need Prompt Service?
Call Your Nearest
Producto Branch:**

Bridgeport 1	970 Housatonic Avenue
New York 12	197 Lafayette Street
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Detroit 11	3017 Madbury Avenue
Cleveland 14	3200 Lake-Ida Avenue
Dayton 7	3632 Delphos Avenue
Chicago 44	Federal Machinery Sales Co.
Los Angeles 21	Jamison Steel Corp.
San Francisco 7	Jamison Steel Corp.

It is no secret that the ease of operation of the slide changer, illustrated above, is due to the precise stamping of the frames. To obtain consistently accurate frames, the Airequip Mfg. Co., New Rochelle, N. Y., selected a Producto die set to mount their die. Result — practically no rejects, and an amazing production rate of 200 frames per minute!

Call your nearest Producto branch . . . they have the answer to greater stamping accuracy and higher production.

THE PRODUCTO MACHINE COMPANY
960 Housatonic Ave., Bridgeport 1, Conn.

FOR PRECISION DIE SETS . . . FAST . . . CALL . . .



ALSO MAKERS OF DIE ACCESSORIES, FEEDING EQUIPMENT, VISES, MACHINERY.

4PD52

September, 1952

35



18" HEAVY DUTY DRILL PRESS

**With 6 "Bonus" Features
For Better All-Around
Heavy Duty Drilling**

- ★ 6½" Spindle Travel
- ★ 39" Max. Distance Spindle to Table
- ★ 63/64" Spindle—Nose, No. 3 MT
- ★ Head and Table Positioning Mechanism
- ★ Vernier Depth Stop Control
- ★ Ball Bearing Drive

Get these important new drilling advantages with a Clausing 18" Drill Press. The 6½" spindle travel gives bigger job capacity, permits better use of production chucks. Drilling capacity: ¾" in steel, 1" in cast iron. There's 6" to 13" *more* capacity from spindle to table. Spindle is bigger, stronger—handles larger tools. Exclusive vernier control provides .001" depth accuracy. Positioning mechanism saves set-up time—moves *both* head and table. Massive construction, precision-machining throughout, and the smoothness of 5 ball bearing races insure exacting accuracy on every operation. Contact your Clausing distributor, or write for catalog.



Precision Ground 13" x 18"
Oil Table, 12" x 14" Base

CLAUSING DIVISION

ATLAS PRESS CO., 9107 NORTH PITCHER STREET, KALAMAZOO, MICH.

SANFORD

MODEL MG

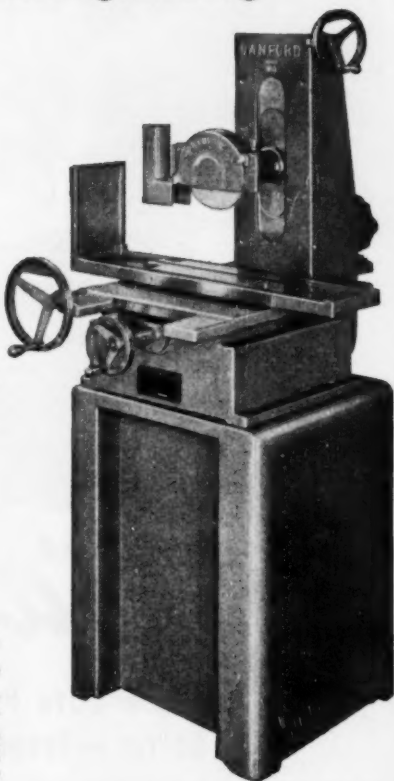
SURFACE GRINDER

for WET or DRY grinding

HAS
THE
"FEEL"

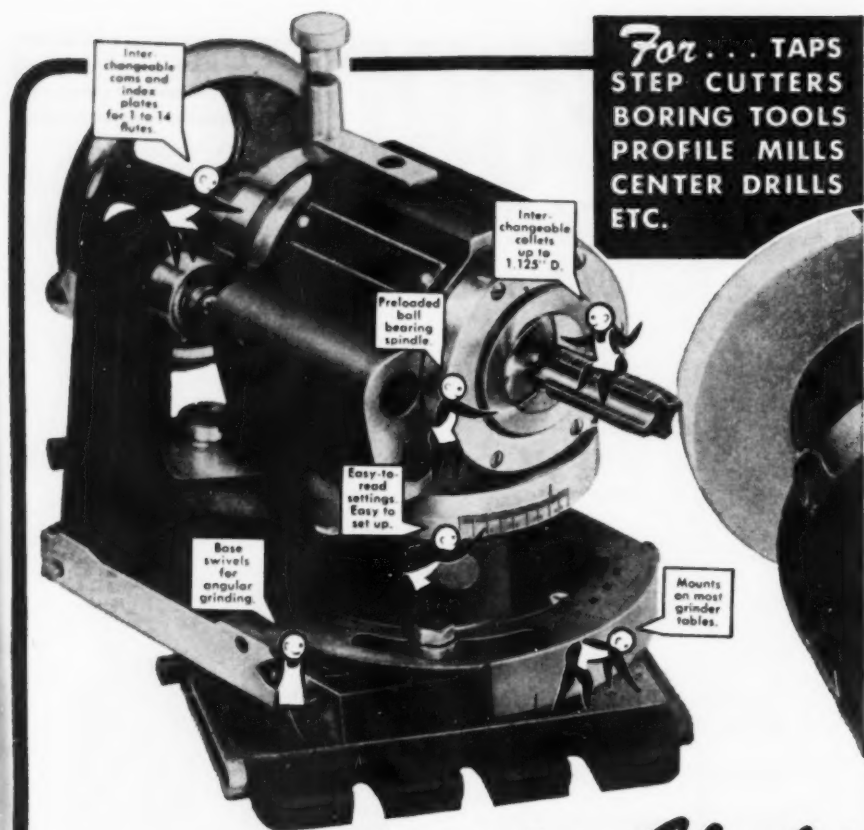
- Looks well.
- Performs like a grinder costing 2 or 3 times as much.
- Constant — repeat orders prove user acceptance.
- Micro-inch accuracy.
- Built by manufacturers who concentrate on small grinders *only*.

CAPACITY: $8\frac{3}{4}$ " transverse, 13" longitudinal, 12" vertical under 7" dia. Wheel with Adapter. Meehanite Castings for sturdy construction, (weight appr. 630 lbs.) Vibrationless operation and long life. Does form grinding by crush method and finishes to dependably superior accuracy.



Write for complete literature and price lists.

 **SANFORD** MANUFACTURING CORP.
1026 Commerce Ave., Union, N. J.



For... TAPS
STEP CUTTERS
BORING TOOLS
PROFILE MILLS
CENTER DRILLS
ETC.

What a relief!

**More Cuts Per Grind
Better — Freer Cutting**

Reduce perishable tool costs with this preferred grind on your straight and spiral flute production cutters — Easy and fast as ordinary angular relief grinding.

D-5 GRINDER DIVISION
ROYAL OAK TOOL & MACHINE CO.
621 E. Fourth St., Royal Oak, Mich.

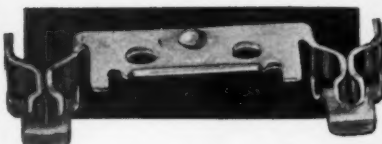
**D-5
RADIAL
RELIEF
GRINDER**

PRODUCTION RECORDS *Broken* with **NILSON 4-Slide Machine!**

Another example of
FASTER, LOWER COST FORMING
of Ribbon Metal Stock

★
**180 Terminal
Contacts
Per Minute**

★
**7 Separate
Operations
Eliminated**



A famous national manufacturer tripled production of the Terminal Contact illustrated above (in actual size) and reduced production costs proportionately by replacing several progress die set-ups with one Nilson S-3-F four slide machine. Seven separate operations were eliminated; 180 completed contacts produced per minute. Time required for tooling changes was reduced 50% over similar type machines.

This example clearly shows the big savings you can make in overhead, maintenance, labor and time with a Nilson 4-slide!

Taking stock directly from the coil, **NILSON** metal ribbon stock four-slide machines automatically feed, straighten, pierce, blank, swage, stamp, coin, cut off and perform up to five forming operations with speed and accuracy. Built in five models with capacities up to 2 1/2" wide and feed lengths up to 15". For specific recommendations on your wire and ribbon metal forming problems, send details, prints or samples of your operation to us when you request the bulletin.

THEY'RE **NOTHING LIKE A**
NILSON

Specialists in Wire Forming Equipment for Over 50 Years

THE A. H. NILSON MACHINE COMPANY

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OTHER NILSON PRODUCTS:

- Automatic chain-making machines
- Wire and Stock reels
- Wire straightening equipment
- Automatic staple forming machines
- Foot Presses
- Slide Feeds for Presses



From PIGMY
Size 0 to
GIANT 5

VERTICAL:

Size 0 to 5
Table sizes 22"x17"
up to 90"x20"

PLAIN:

Size 0 to 4
Table sizes 22"x7"
up to 76"x15½"

UNIVERSAL:

Size 1 to 4
Table sizes 29"x8"
up to 76"x15½"

— also —

MANUFACTURING MILLERS:

Sizes 1, 2, 3
2-19 3-25

Shown above:

No. 0 Vertical

Shown at right:

No. 3 Vertical

No. 3 Plain

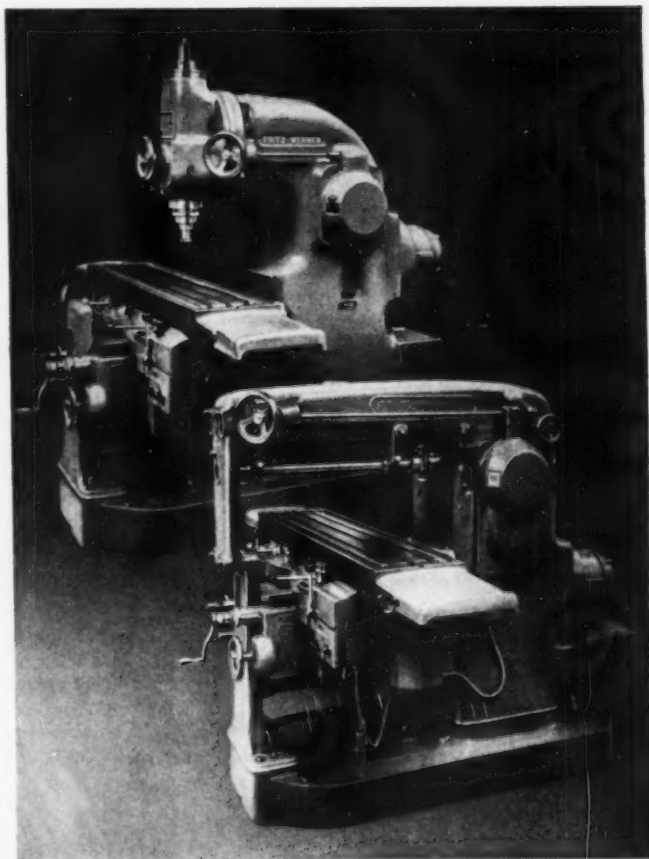
**PROMPT and
REASONABLE
DELIVERIES**

*For further information
about these and
other machines con-
tact Dept. MT*

MARAC

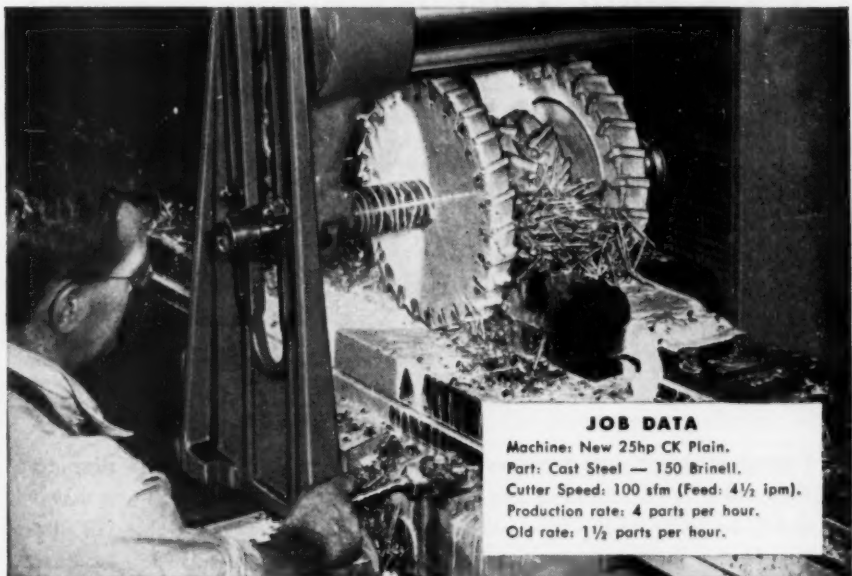
MACHINERY CORP. 1819 BROADWAY, NEW YORK 23, CI 7-2048

WERNER MILLERS



FACTS TELL THE STORY...

NEW CK MILLING MACHINE PAYS USER BIG PRODUCTION DIVIDEND



CK Milling Machine Features that helped do this job BETTER

- Greater Rigidity of new CK column easily absorbed vibration from heavy cutting load. Only single pass needed for each part.
- Smoother Feed of CK's large (2" dia.) screw and extra-long table feed nut permitted heavy cut.
- No. 60 heavy-duty drive flange around spindle nose permitted use of extra-rigid, large-diameter arbor on multiple cutter setup.
- CK's positive, metered, pressure and automatic lubrication to all parts assured wear-free operation regardless of cutting load.
- 24 different spindle speeds (13 to 1300 rpm) plus 32 different table feeds (¾" to 90 ipm) meant operator selected exact combination to get fullest advantage from high horsepower and modern cutting tools.

● Greater Horsepower of CK machine meant maximum results from modern cutting tools.

● CK's 3-bearing spindle and flywheel assured fastest metal removal with desired finish in single pass.

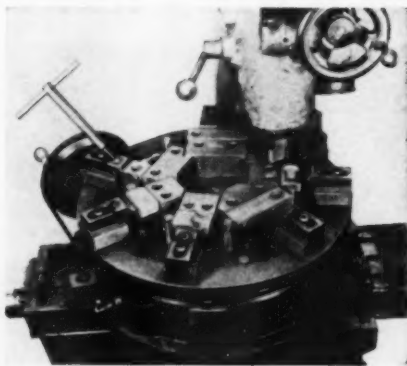
Investigate the new CK line of milling machines. Every feature is job and test proven to give you cost-cutting results, plus greater productivity—better finished products. Contact our nearest representative or write: Kearney & Trecker Corp., 6734 West National Avenue, Milwaukee 14, Wisconsin.



PRODUCTION OUTPUT CLIMBS WITH NEW J&S JAW CLAMPS

The Clamp You Can't Afford To Be Without

Eliminate U-clamps, Straps and fingers on lathes, planers, milling machines, drill presses and boring millers! Also in most cases, eliminate 4-jaw chucks, vises and special fixtures!



Production milling - motorized turn table on miller - $2\frac{1}{2}$ R.P.M. - 7 stations - has enabled this manufacturer to increase his production 5 TIMES - Standard clamp being used.

Fastest, simplest—work-pieces held rigidly. Less obstruction, *no slipping* because a $1/16$ " tapered slot insures firm grip. Also, angle of jaw travel is 45° to plane of the face plate or table. As the screw is tightened, the jaw forces the work-piece down against the machine surface—across against the opposite clamp—this grip is stronger than that provided by eight U-clamps! Allows overall machining to within $3/8$ " of the machine's working surface! Available in types and sizes to suit all applications. "T" nuts furnished to fit all standard machines.

DELIVERY FROM STOCK!

WRITE FOR NEW FOLDER!

—contains complete details on advantages, applications, types and sizes available. Booklet describing J & S "Fluidmotion" Wheel Dressers, etc., also sent on request.



J&S TOOL CO., INC.

471 Main Street, East Orange, N. J.

Representatives in Principal Cities

Get **ROUGH** with **POLISHING COSTS**



Cut 'em down to size with time-saving output boosting **BEHR-MANNING** coated abrasive belts. They cut cooler longer, produce more uniform finishes, and offer greater flexibility. Whether you're roughing, finishing, or coloring flats or contours, you can get just the right belt, contact wheel and application method with **BEHR-MANNING** products and engineering service. See how easy it is.



For these special polishing jobs

BEHR-MANNING Mechanical Polishing coated abrasives tools are just the thing for deburring, producing radii, chamfering, and polishing difficult areas. Get your free copy of "Blueprints for Production" for full details. Write Behr-Manning, Troy, N. Y. Export: Norton Behr-Manning Overseas Inc., New Rochelle, N. Y., U. S. A.; Canada: Behr-Manning (Canada) Ltd. Brantford, Ont. Address Dept. BB-9.



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- ▲ PRESSURE-SENSITIVE TAPES

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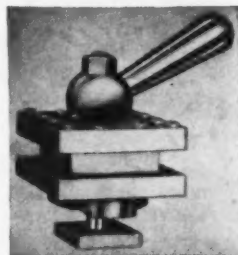
"HARD TO FIND TOOLS FOR STOCK DELIVERY"

ROYAL TOOL POST TURRETS

WITH 12 POSITION INDEXING

Permit work to be done on ordinary lathes that ordinarily requires a turret lathe. Exceptionally flexible . . . Dependable accuracy maintained in every re-indexed position. Protected against dirt and metal chips. All working parts hardened and rust-proofed. Heavy duty steel construction.

Made in complete size range, 3 models; Finger-tip control; 3 working positions for each tool; indexing in one complete unit. Fully guaranteed!



Dimensions Model No.	Tool Block Specifications	Tool Size Range	Approx. Lathe Swing	Ship. Wght.	Price Each
250	4 tool, 12 position 2 1/2" sq. x 1 1/2" thick	1/4" to 3/4"	Bench Lathes	3 1/2 lbs.	\$27.50
350	4 tool, 12 position 3 1/2" sq. x 1 3/4" thick	5/8" to 1 1/2"	10" to 13"	9 lbs.	\$39.50
450	4 tool, 12 position 4 1/2" sq. x 2 1/4" thick	1 1/2" to 1 3/4"	13" to 16"	15 1/2 lbs.	\$59.00

Model 250 available from stock ready for immediate use on Atlas, South Bend and Logan Lathes. Turrets available with a machineable base.

HIGH SPEED CORNER ROUNDING END MILLS



For use in milling rounded corners, etc. They are of the form relieved type and can be sharpened many times without changing the form.

Radius	Dia. of Shank	Largest Dia.	Whole Length	Net Price Each
1/16	3/8	7/16	2-1/2	\$ 6.66
3/32	3/8	1/2	2-1/2	6.99
1/8	1/2	5/8	3	8.63
3/32	1/2	3/4	3	9.61
3/16	3/4	7/8	3-1/8	11.03
1/4	3/4	1	3-1/4	12.01
5/16	7/8	1-1/8	3-1/2	14.09
3/8	7/8	1-1/4	3-3/4	16.28

DOVETAIL CUTTERS

Shank Type — High Speed Steel

Designed to take the place of arbor type and threaded hole angle cutters. Advantageous in reducing set-up time. Ease of handling make them the ideal tool for milling dovetails.

45° and 60° angle R.H. cut are standard. Please specify angle.

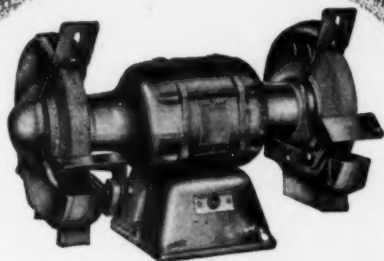


Cat. No.	Angle	Dia. of Cutter	Width	Dia. of Shank	Overall Length	Net Price Each
DT-24	45°	3/4	5/16	3/8	2-1/8	\$ 7.19
DT-44	45°	1-3/8	9/16	5/8	2-7/8	10.57
DT-24A	60°	3/4	5/16	3/8	2-1/8	7.19
DT-44A	60°	1-3/8	9/16	5/8	2-7/8	10.57

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list? Write us today!

SID TOOL COMPANY, INC.
CUTTING TOOL SPECIALISTS
126 LAFAYETTE STREET • NEW YORK 13, N. Y.

PHONE: BE 3-4270



NEW BALDOR **W-I-D-E clearance grinder**

The new BALDOR Streamlined grinder, 8200 series, is excellent for grinding long and odd-shaped pieces as there's plenty of clearance between the wheels and the motor frame.

It is recommended for grinding off metal burrs, weld seams, rust, scale, etc. Has 3-way adjustable tool rests to permit angle grinding, and is equipped with exhaust type guards.

½ h.p., 3450 r.p.m., capacitor-start, capacitor-run motor
GUARANTEED 2 YEARS against burn-out. Complete, as shown, \$86.00.

ASK FOR BULLETIN 353

Baldor

BALDOR ELECTRIC COMPANY
4353 Duncan Avenue • St. Louis 10, Missouri



UNPARALLELED GRIP from parallel jaws

Latest And Greatest In Collet Design! Tool engineers and machine tool builders praise the Jacobs Rubber-Flex Collet as one of the outstanding developments in modern tool history. This new principle of collet construction brings you not only great improvements in gripping power, accuracy, and service life, but — *for the first time* — a collet with a full $\frac{1}{8}$ inch capacity range.

Jacobs Chucks are stocked and sold by your Industrial Supply Distributor.

The Jacobs Manufacturing Company, West Hartford 10, Conn.

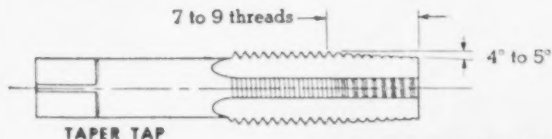


The Rubber-Flex Collet, previously available in Jacobs Tap and Drill Chucks, is now offered in our popular Spindle Nose Lathe Collet Chuck — offering features never before obtainable in a nose type Lathe Collet Chuck.

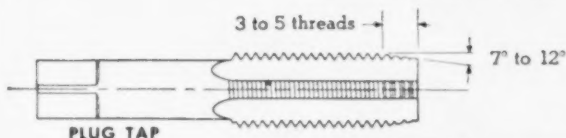
IF IT'S A
JACOBS
IT HOLDS

USE THE RIGHT TAP

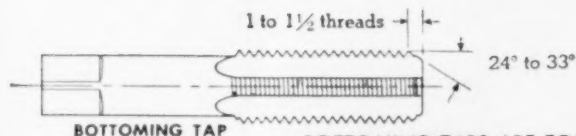
(HOW TO DO MORE TAPPING WITH FEWER TAPS)



TAPER POINT TAPS ARE FOR USE IN THROUGH HOLES. LONG CHAMFER HELPS STRAIGHT STARTING AND DISTRIBUTES CUTTING LOAD.

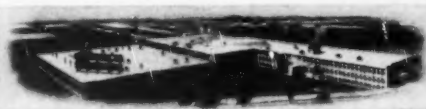


PLUG POINT TAPS ARE THE MOST COMMONLY USED FOR AVERAGE PRODUCTION. CAN BE USED IN TAPPING THROUGH HOLES OR IN BLIND HOLES IF ENOUGH CLEARANCE IS ALLOWED IN THE BOTTOMS OF THE HOLES.



BOTTOMING TAPS ARE FOR USE IN BLIND HOLES WHERE IT IS NECESSARY TO THREAD ALL THE WAY TO THE BOTTOM.

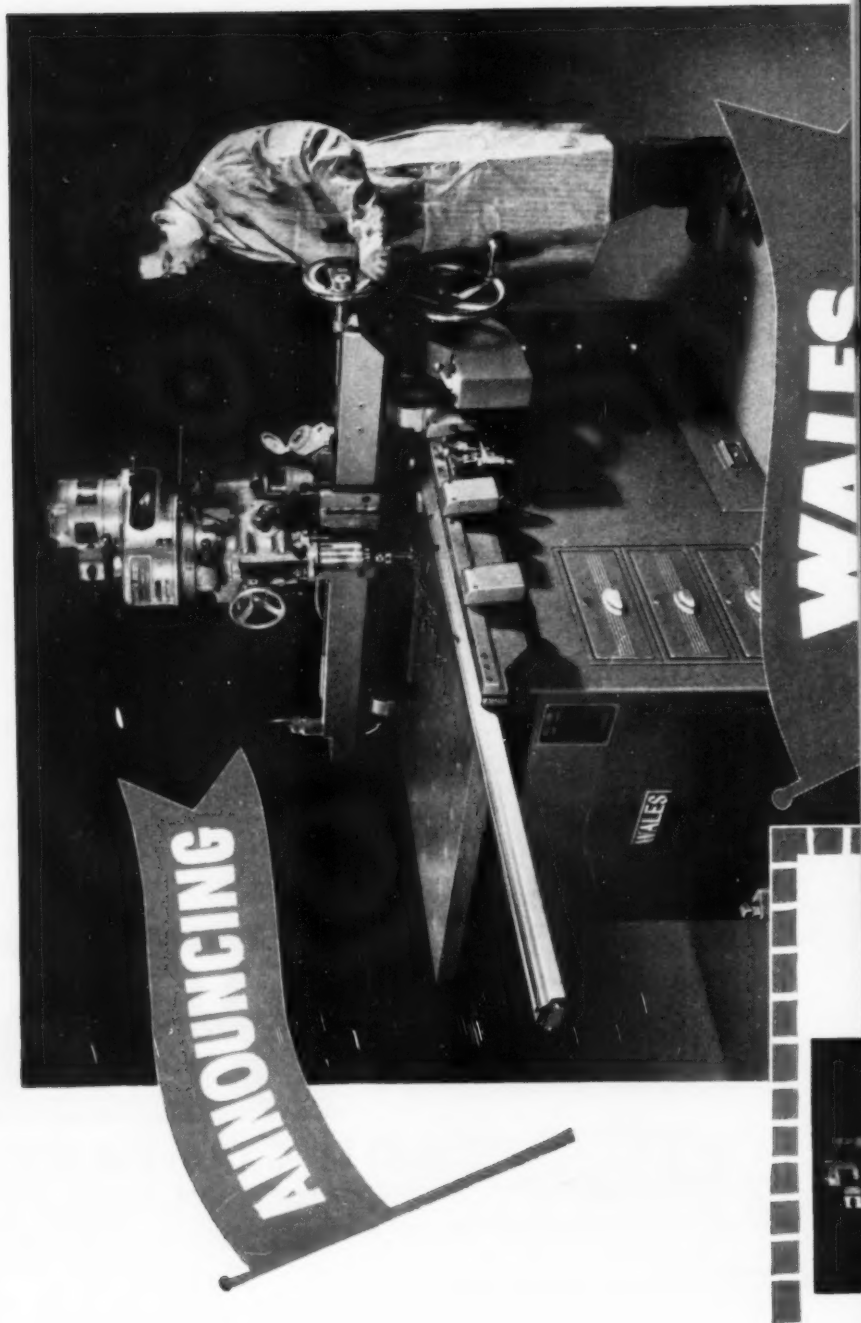
THREAD MORE HOLES
WITH FEWER TAPS
INSIST ON ...



TOOL COMPANY

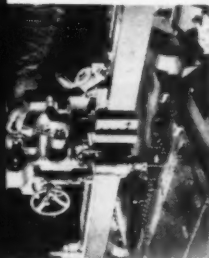
NEW BEDFORD, MASS., U. S. A.

**HY-PRO
TAPS**



BORING

Close-up of boring operation on Wales Deluxe Model Drilling Machine.



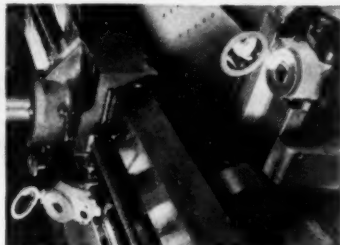
DRILLING & REAMING

Showing a hole in the work being reamed by simply interchanging the drill and bushing with corresponding size reamer and reamer bushing.



SCAN-A-SCALES

Showing the 2 built-in "Scan-A-Scales" that accurately locate drill head and slide rail for "zeroing in". Air locking clamps hold the work rigid during drilling operations.



drilling machine

with new boring head

WALES new Deluxe Model Drilling Machine has been developed for more versatile operations including BORING, DRILLING, REAMING and CLOSE TOLERANCE LOCATING. *There is no other boring and drilling machine or jig borer like it.* Precision, speed and ease of operation are built right into this machine.

Accuracy is the primary consideration in manufacturing this exclusive Wales Drilling Machine that handles material of practically any length and up to 36" wide.

A pair of built-in "Scan-A-Scales" calibrated in one ten thousandths of an inch accurately locate head and slide rail after rough positioning by rapid traverse.

This is too BIG a story to tell here so write TODAY for fully-illustrated, functionally-colored Catalog DM.

WALES-STRIPPIT CORPORATION

GEORGE F. WALES, Chairman

396 PAYNE AVE., NORTH TONAWANDA, N. Y.

(Between Buffalo and Niagara Falls)

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Specialists in Punching and Notching Equipment

A SHARP POINT

EVERYTIME!



Hammond OF KALAMAZOO
CARBIDE TOOL GRINDERS

Ask any user of the MORE THAN 6,000 HAMMOND CARBIDE TOOL GRINDERS now in service — "point by point" all the way through — these machines are precision built for efficient trouble-free grinding of CARBIDE AND HIGH SPEED STEEL TOOLS.

There's no substitute for experience, and Hammond has been building dependable machinery for 70 years!

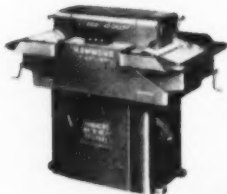
Write for Catalog A-225



Model CB-77 Chip Breaker and Diamond Finishing Grinder for handling box and single point tools. (Model CB-77W for wet grinding also available).



Model WD-10 Wet or Dri 10" Carbide Tool Grinder with double cup wheel construction. (Available with straight and cup wheel also).



Model 14-WD Wet or Dri 14" Carbide Tool Grinder. Designed for production grinding of medium and large size tools. Will quickly pay for itself in longer tool life, wheel economy, and faster grinding.

"Good Machinery Since '82"



Hammond Machinery Builders
INC.

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SAVE WEEKS OF VALUABLE TIME!

It's easy to SHARPEN all types and sizes of BROACHES with this

VERSATILE

LAPOINTE

UNIVERSAL BROACH SHARPENER

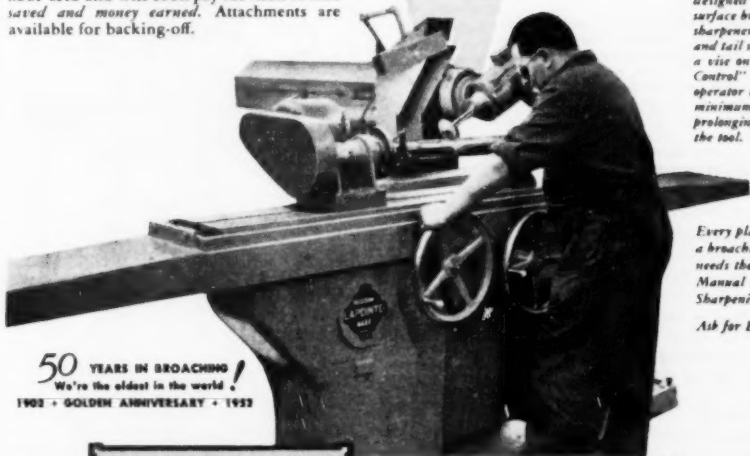
Built with simplified "Touch-Controls", it practically eliminates all need for skill in sharpening broaches. Any reasonably good tool man can do an expert job in no time at all!

We design and build a complete line of standard and special broaching machines, tools and fixtures.



Available in 3 SIZES: 60", 72" and 80", the LAPOINTE Universal BROACH SHARPENER occupies a surprisingly small floor area and will soon pay for itself in time saved and money earned. Attachments are available for backing-off.

Ask us about the NEW 36" LAPOINTE Broach Sharpener designed especially for surface broaches. This sharpener has no head and tail stock, but uses a vise only. "Touch-Control" enables the operator to remove a minimum of stock, thus prolonging the life of the tool.



Every plant that owns a broaching machine needs the LAPOINTE Manual on Broach Sharpening.

Ask for Booklet BSM-7

50 YEARS IN BROACHING!
We're the oldest in the world.

1902 - GOLDEN ANNIVERSARY - 1952

THE

LAPOINTE

MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.
Branch Factory: Watford, Herts., England

NEW
LAPOINTE
BOOK

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

SIX SPINDLE
PRE-SELECTIVE SPINDLE SPEEDS
TURRET TYPE AUTOMATIC INDEXING
DRILLING AND TAPPING MACHINE

... gives you

6 MACHINES
IN ONE

THE NEW No. 2 MODEL A

Burgmaster

Designed for ...

HIGHER PRODUCTION WITH GREATER
ACCURACY AT LOWER COST
PER PIECE MACHINED

The No. 2 Model A BURGMASER will definitely cut your second operation costs because: Loss of time due to movements of parts from one spindle to another are eliminated; Close tolerances on size and concentricity are easily maintained; Set-up is simple and fast—unskilled operators can run the machine; Less floor space and power required; Rigidity, power and spindle speeds permit the use of high cutting speeds; Now equipped with Warner electric clutch units in speed change mechanism.



- ★ 1/4" Drill Capacity
- ★ 1/8" Tap Capacity
- ★ 1 to 2 H.P., 2 speed, 3 phase, 60 cycle Motor
- ★ 12 Spindle Speeds, ranging from 225-3000 R.P.M.
- ★ 4 Speeds, pre-selective per spindle, at any one setting
- ★ 8" Ram Feed
- ★ 19" Table Travel
- ★ Throat Depth—11-5/16"
- ★ Spindles Mounted on Class "O" Timken Bearings

- ★ Power Index, utilizing Geneva Mechanism
- ★ Individual Depth Stops
- ★ Completely Enclosed Gear Box
- ★ Table work surface—17"x33"
- ★ Approximate weight—1650 lbs.
- ★ Floor space required—78"x48"
- ★ Extremely close tolerance can be held



Write today for detailed information.

BURG TOOL MANUFACTURING CO. DEPT. BB9

3743 DURANGO AVENUE • LOS ANGELES 34, CALIFORNIA

Users report **AMAZING RESULTS**

with

TRIM* COOLANT

**NO
STINK
RUST
OR
Gumming**

That's right—no stink is almost your guarantee, no rust, because TRIM has an unusual combination of ingredients to prevent it. No gumming or machining problems for one year of field use.



WELL KNOWN MACHINERY MANUFACTURER RUNS COMPLETE SHIFT WITHOUT CUTTER CHANGE AFTER SWITCHING TO TRIM . . . THE MASTER COOLANT.

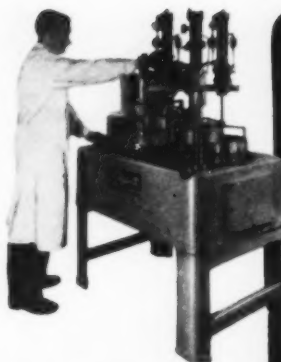
Reports from TRIM users, large and small, consistently reveal increased production, longer tool life and a host of other advantages. For example, just the other day a large machinery manufacturer now producing armor plate tank turrets and tank engine covers submitted the following information:

Cuts were made to a depth ranging from $\frac{1}{2}$ " to $1\frac{1}{4}$ " with HSS face mills $14\frac{1}{2}$ " in diameter mounted on large boring mills. Previously, a sulphurized soluble oil coolant at a 10 to 1 concentration was employed with the result that 3 to 4 cutters per shift were used, or a maximum of $1\frac{1}{2}$ cases per grind. Here's what happened when they changed to TRIM: Mixed 20 to 1, this manufacturer now runs a complete shift without a cutter change, or a maximum of 5 cases per cutter grind. Cutters with TRIM required a minimum of regrinding to be resharpened . . . thus relieving a bottleneck in the tool grinding department. In the same plant, TRIM with 20 to 1 concentration is giving equally excellent results on boring, spotfacing, drilling and tapping . . . and increasing tool life from 2 to 5 times on the same material.

**Seems to us that TRIM can also do a job for you.
Write day for complete details.**

PRODUCT OF
MASTER CHEMICAL CORPORATION
13 HURON STREET • TOLEDO 4, OHIO

*TRIM is our trade-mark name for coolant concentrate covered by pending patent applications.



Standard Lapmaster "24" with 3 conditioning rings. Lapmasters are also available with 12", 36", 48" and 72" lapping plates.



Production Increased From 1000 to 7000 Parts Per Day

Parts are $\frac{5}{16}$ " in diameter, have a .025" diameter stem, $\frac{1}{8}$ " in length. The $\frac{5}{16}$ " bearing surface must be lapped flat to within 2 light bands, finish requirement is 3 RMS. The parts are turned on a screw machine, hardened, and then lapped by the Lapmaster. Eliminating grinding and finishing operations results in this tremendous labor saving.

Finish Grinding Eliminated & 2 Machines Replaced by 1 LAPMASTER

This Lapmaster is used to

HOW LAPMASTERS

- Increase Production
- Lower Costs and
- Improve Product Performance

New Method and Machine Design Principle Offers Cost Reductions PLUS Consistent Accuracy

Lapmasters are extremely versatile lapping machines. They generate precision flatness and finish in short runs or in high production quantities. In one cycle, Lapmasters precision-lap either identical parts or parts of dissimilar shapes and materials. The self-conditioning lap plate, alone, accounts for tremendous cost savings because there is no loss of production time for replacing or re-conditioning.

lap seal parts of a wide variety of materials including cast iron, bronze, carbon, ceramics, stellite, etc. Frequently different materials are processed in the same cycle. A big savings of the

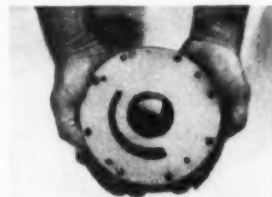
grinding created leakage through mating joints and high number of rejects. With the Lapmaster, a complete storeroom of rejects were salvaged, rejects were completely eliminated and the finish grinding operation was eliminated.



Lapmaster over previous equipment was the elimination of finish grinding operations previous to lapping.

Leakage Between Mating Joints Eliminated

Production on this Lapmaster is 3000 parts per day. Distortion resulting from



Get All the Facts

Write for this informative 16 page booklet today. Ask for Bulletin No.

BB-9



JOHN CRANE

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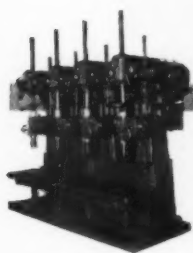
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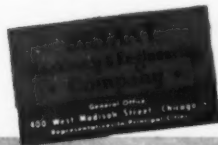
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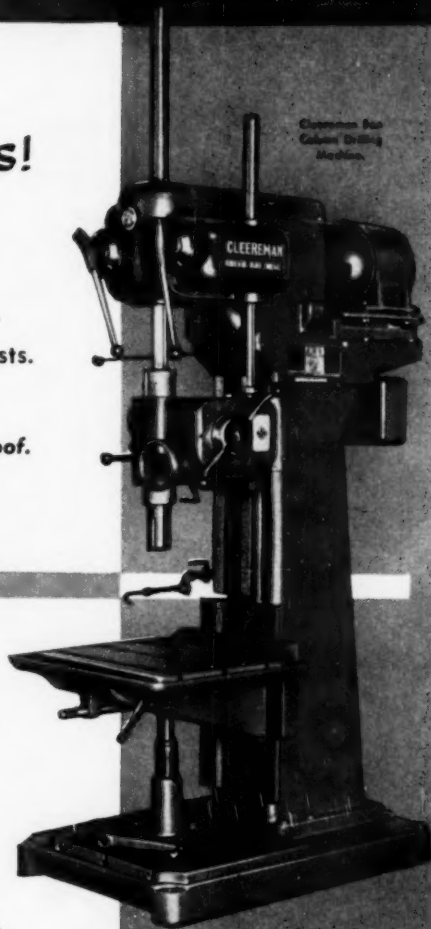
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Drilling Machine.



Cleereman Round Column
Drilling Machine.

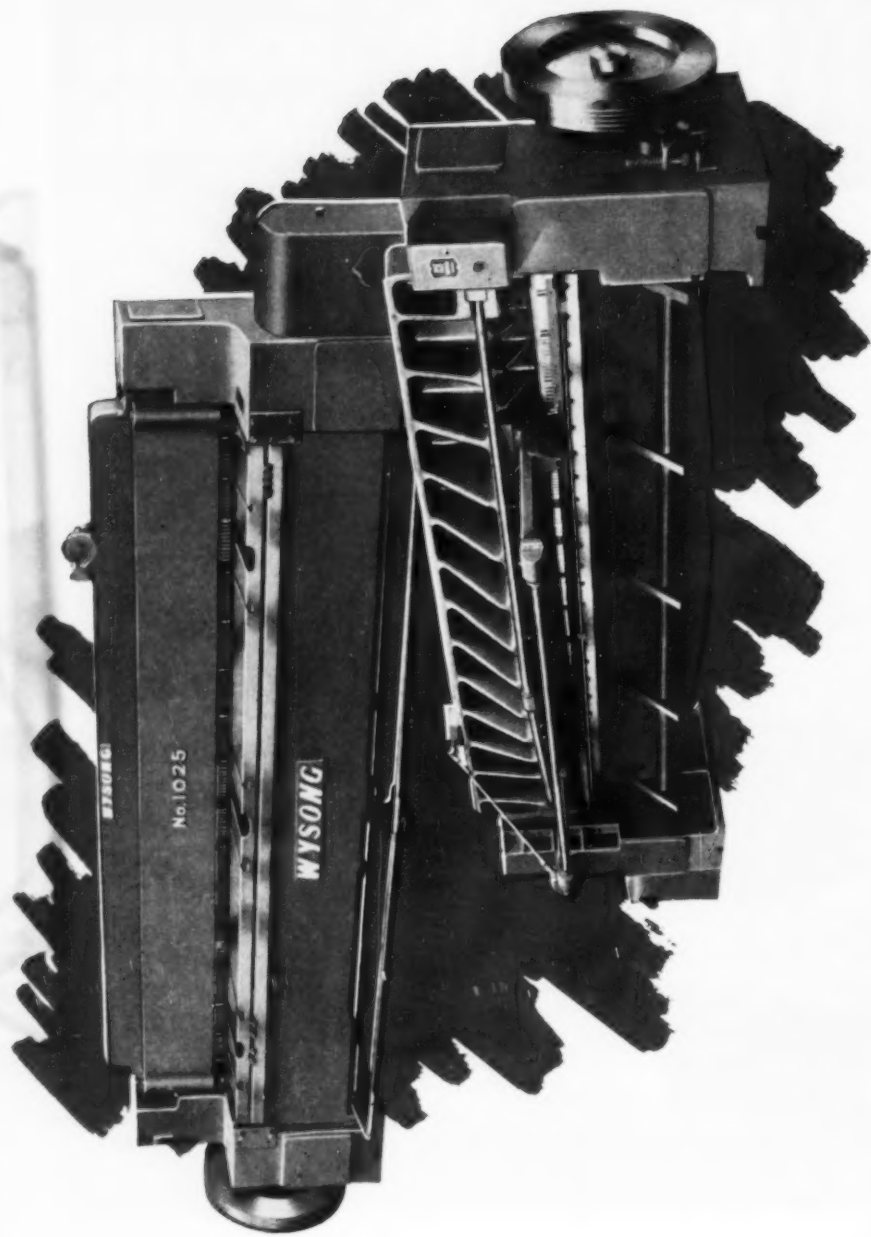


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CLEEREMAN MACHINE TOOL CO. Green Bay, Wisconsin
BUILDERS OF PRECISION JIG BOXES AND DRILLING MACHINES



WYSONG 1 1/2 INCH PLATE SHEARS

No matter how you look at it you can see the massive, rigid construction of the WYSONG 1/4-inch series . . . made in 4, 6, 8, and 10 feet cutting lengths. Bed, end frames, and knife bar are one-piece Hi-tensile castings. Bearing surfaces between end frames and table, and gibbed ways for hold-down and knife bar travel are hand scraped for perfect fit and true squaring.

A clearly visible cutting line makes it easy to cut to a scribed line. Slotted metal finger guard, mounted on hold-down, protects fingers without obstructing view.

An automatic, mechanically operated *hold-down* provides powerful, positive hold down

action. The simplicity of the roller and cam action makes it sure and trouble free. Individual compression springs in each foot compensate for varying thicknesses in metal being sheared . . . Front operated, ball-bearing *back gauge*, is adjustable to .0078 (1/128th) of an inch, is standard equipment. A *power operated back gauge*, in ranges of 24 and 36 inches can be furnished at extra cost . . . Powerful WYSONG *jaw-type clutch* has built-in non-repeat unit.

For performance . . . feature for feature and dollar for dollar, you can't beat the value of WYSONG squaring shears. Compare the WYSONG line with others in the field . . . and for sheer satisfaction, buy WYSONG.

WYSONG builds Squaring Shears in cutting lengths from 3 feet through 12 feet, in motorized, air-power and foot-power models; O. B. I. Presses; Slip Roll Formers; and Rotary Combination Machines. See your dealer or write factory for full information.

Wysong and Miles Company, Greensboro, North Carolina

Illustrated above: Wysong No. 1025, Cap. 10 ft., 1/4in., mild steel

WYSONG

Chicago MOUNTED Wheels

FIRST, FOREMOST AND FINEST... here is a custom-built product that will fulfill virtually every type of grinding and polishing requirement. Chicago Mounted Wheels are faster cutting—they speed up production—last longer—cost less. Your choice of a complete selection of grains, grades, abrasives, and bonds.

Chicago Mounted Wheels—recommended by skilled mechanics and craftsmen everywhere—are exclusively guaranteed to remain on their mandrels, perfectly balanced, and easily dressed. They run either way, with no backing off screw or nut when grinding reverse. Millions are now in daily use—in machine, pattern and die shops, foundries, tool rooms, ordinance plants and arsenals.

Shown at right are just a few shapes—Chicago Wheel manufactures 127 different styles and shapes—this means a wheel to fully satisfy every application. Every wheel is backed by the experience and "know-how" of more than 50 years of specialization.

Group A— $\frac{1}{4}$ " shank. These Chicago mounted wheels are suitable for use on all types of portable grinders and flexible shafts.

Group B— $\frac{1}{8}$ " shank for the 5 series and $\frac{3}{32}$ " shank for the series. Mandrel lengths for all groups $1\frac{1}{2}$ ".

All prices subject to discount.

GROUP A



A3— $\frac{1}{4}$ " shank
List—\$2.05



A4
 $\frac{1}{4}$ " shank
List—\$1.30



A11— $\frac{1}{4}$ " shank
List—\$1.40



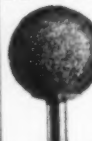
A13
 $\frac{1}{4}$ " shank
List—\$1.30



A15— $\frac{1}{4}$ " shank
List—\$1.05



A21
 $\frac{1}{4}$ " shank
List—\$0.90



A25
 $\frac{1}{4}$ " shank
List—\$0.90



A31
 $\frac{1}{4}$ " shank
List—\$1.10



A37
 $\frac{1}{4}$ " shank
List—\$0.8



A38
 $\frac{1}{4}$ " shank
List—\$0.75

GROUP B



5-B45— $\frac{1}{8}$ " shank
List—\$0.70
4-B45— $\frac{3}{32}$ " shank



5-B52— $\frac{1}{8}$ " shank
List—\$0.75
4-B52— $\frac{3}{32}$ " shank



5-B70— $\frac{1}{8}$ " shank
List—\$0.70
4-B70— $\frac{3}{32}$ " shank



5-B101
 $\frac{1}{8}$ " shank
List—\$0.80
4-B101
 $\frac{3}{32}$ " shank



5-B121— $\frac{1}{8}$ " shank
List—\$0.70
4-B121— $\frac{3}{32}$ " shank



5-B42— $\frac{1}{8}$ " shank
List—\$0.75
4-B42— $\frac{3}{32}$ " shank



5-B131— $\frac{1}{8}$ " shank
List—\$0.55
4-B131— $\frac{3}{32}$ " shank

MOUNTED Wheels are the safest and strongest of any type of grinding wheel

MOUNTED

Best in the Market

Nearly one-half of all top-rated industrial concerns in America use Chicago Mounted Wheels . . . prefer Chicago Mounted Wheels to all others. Here is proof . . . the best products are made with Chicago Mounted Wheels.

Convince yourself — test them in your own plant. See for yourself how much faster, cooler-cutting and longer-lived these outstanding wheels are.

Chicago Wheels are exclusively guaranteed to remain permanently mounted for life.

Chicago Mounted Wheels are available in a wide variety of special treatments for grinding magnesium and other low tensile alloys.

**For every grinding, cutting,
and finishing operation.**



Whether it's Grinding Wheels, Internal Wheels, Cut-off Wheels, or Mounted Wheels, Chicago Wheel is the name to remember.

For all your abrasive specialties, it's a "One-Stop Headquarters" that assures you top quality and maximum variety . . . backed by more than half a century of pioneering experience in the field.

ENGINEERING SERVICE



More than 50 years experience is available to you at all times. Our District Offices can quickly furnish you with skilled engineering service.

FREE!

64-PAGE CATALOG



gives you full details on the entire Chicago Wheel line. Fully illustrated. Plenty of helpful grinding tips and other information. Write for your copy today . . . there's no obligation.



CHICAGO GRINDING WHEELS

There is a Chicago Grinding Wheel for every portable tool operation.

Exclusive . . . new 79E Bond gives you a 5% to 10% boost in grinding and finishing output. It's impervious to water, acid, oil . . . tougher construction to resist breakage . . . lowers down-time.

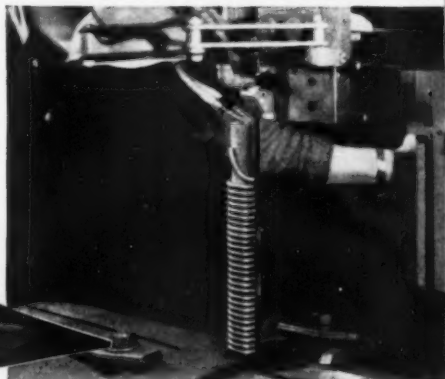
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CHICAGO WHEEL & Mfg. Co.

Dept. MT, 1101 West Monroe St., Chicago 7, Illinois

DoALL BAND

SAVES MAN HOURS,



BAND MACHINING DOES JOB IN 1/3 THE TIME — this job of splitting rings from coiled 1/4" cold rolled steel was formerly done on an expensive milling machine. On a DoALL Contour-matic it is done in 1/3 the time and at far less cost!

THE DoALL CONTOUR-MATIC (illustrated at upper left). This is the most versatile, fastest cutting machine ever introduced to American Industry. It will pay for itself faster than any other machine tool equipment you can buy. Anyone can learn quickly to operate it. Its 40 to 10,000 feet per minute speed range, its hydraulic and automatic controls, its labor-saving accessories make it the most productive band machine in the world and one of the most valuable pieces of equipment you can own.



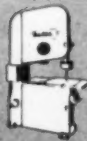
← SAW BANDS, OTHER BAND TOOLS FOR EVERY PURPOSE

Immediate Delivery from Local Stocks
Saw bands for all makes of band machines and cut-off saws available immediately from any one of the 35 DoALL Sales-Service Stores. Sold in 100 and 500 ft. lengths or cut and welded bands to fit your machine.

B-13-S



CONTOUR-MATIC



ZEPHYR



CONTOUR

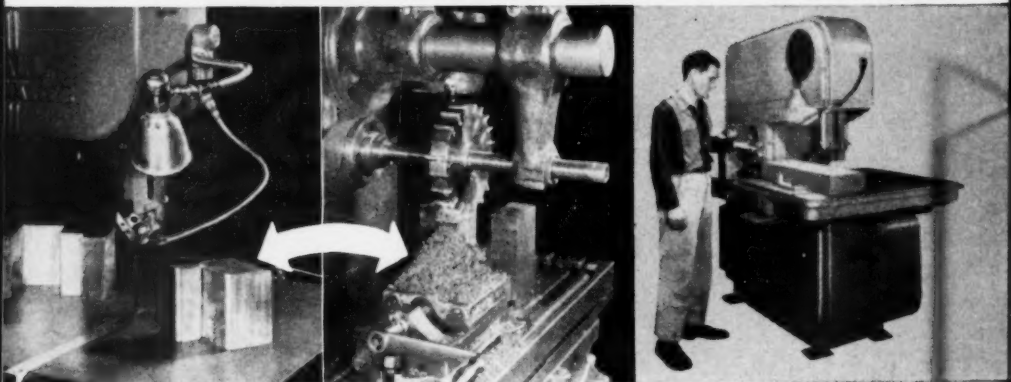


BAND PILOT



SAW BANDS

MACHINING METALS AND MACHINES



CONTOUR MACHINING SAVES METAL BY CUTTING OUT COMPLETE PIECES — these pictures tell a terrific story. Here are two identical shapes cut from identical stock. Ordinary machining reduces it to a pile of chips. Contour machining saves the slug of metal for other use.

DoALL CONTOUR-MATIC FREES \$35,000 MILLING MACHINE FOR OTHER WORK — rough cutting of aluminum aircraft forgings on a DoALL Contour-matic — a machine that represents about 1/6 of the capital investment in milling machines formerly tied up on this operation.

THERE IS a place for DoALL *Band Machining* in every industry for production or maintenance work.

Cuts Continuously — the endless band slices through the material, cutting all the time, all the way, leaving only a thin slot in its wake. It's the world's fastest method of machining the greatest variety of materials to shape.

Direct Cutting of Intricate Shapes — it's easy to follow any layout line with the narrow band tools used.

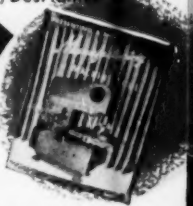
Cuts Any Material — there is a DoALL Band Tool for every sawing, filing, grinding, polishing or friction sawing job on all metals, glass, wood, cloth, leather, rubber, paper, plastics and other materials. Use it to make tools, dies, jigs, parts; to trim, shape, file, polish.

A Machine for Every Purpose and Every Pocketbook — from the inexpensive "Utility" series to the

versatile, all-purpose Contour-matic, there is a DoALL Band Machine for you — the most complete line in the world. Ask to have a free DEMONSTRATION made in your own plant. Call your local DoALL Sales-Service Store or write: 254 N. Laurel Ave., Des Plaines, Ill.

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Learn what DoALL Band Machining can do to save man-hours, metals and machines for you.



DoALL

for more
production



TOOLROOM GRINDER



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LOADING EQUIPMENT



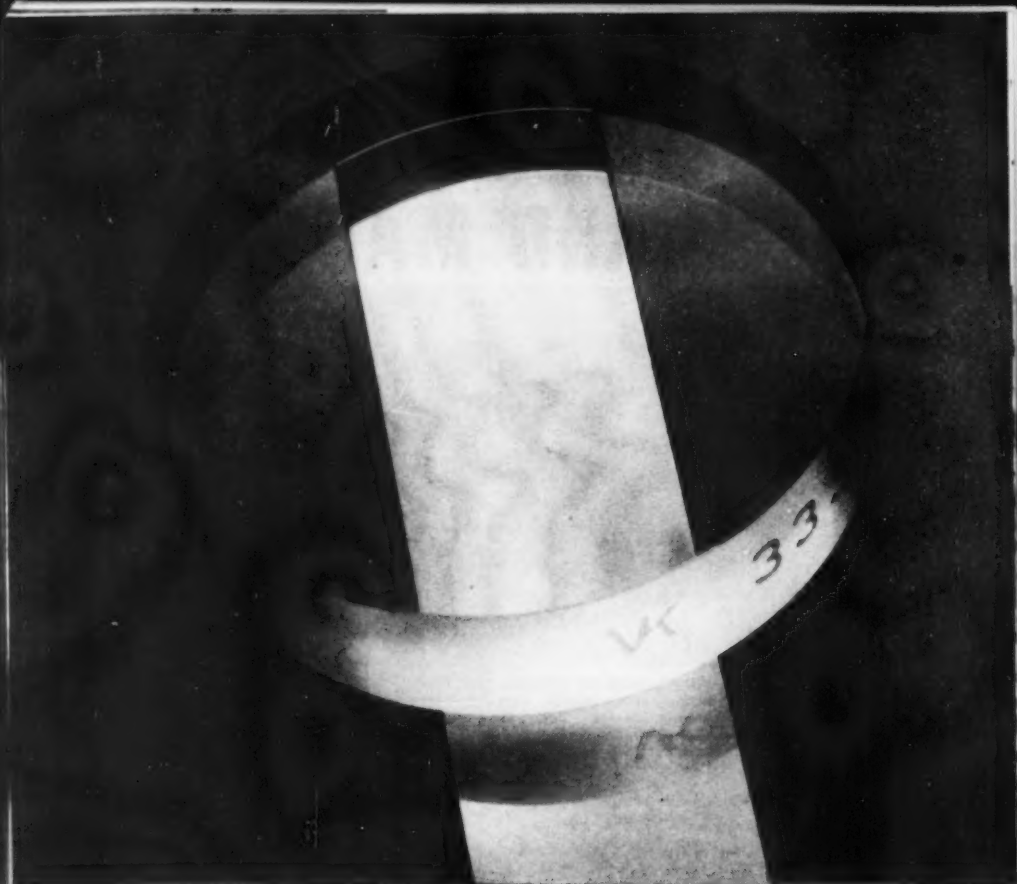
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MOBILE INSPECTION UNITS



TOOL STEEL



Two grooves each .00001" deep on an amplifying gage anvil.

Do your amplifying gages tell the truth?

A SET OF VAN KEUREN OPTICAL FLATS

will tell the story instantly

The Van Keuren 1952 Catalog and Handbook No. 35 give complete details on testing flatness with optical flats and solutions of many other measuring problems.

Write for your copy.

THE *Van Keuren*

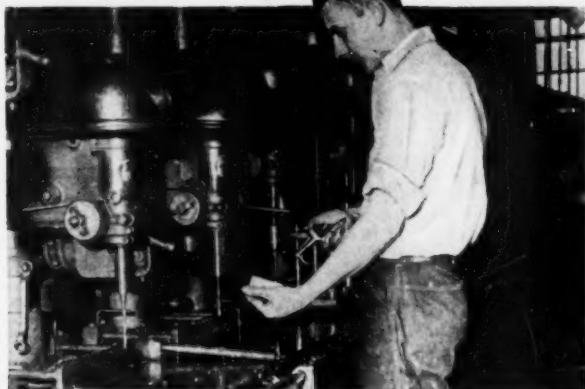
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Put air at your fingertips with a

Schrader Blow Gun



Schrader 9326 Blow Gun—One of thirty-six designs and styles for you to choose from.

You'll find there are Schrader Blow Guns that *just suit* any operation you may have . . . reliably and economically. The #9326 Schrader Blow Gun shown here, for instance, will take the toughest treatment.

- **It's rugged**, both in design and construction. It is drop forged of stainless steel to give years of service. It has a countersunk nose and shielded operating button.
- **It's convenient**—Notice the handy hang-up hook. Hang the gun close to where you need it . . . and remember, this hook acts as a guard, to keep hands away from moving parts.
- **It's economical**—Any Schrader Blow Gun shuts off tightly the instant you lift your finger—delivers air only while it's needed.
- **Thirty-six designs and styles** of Schrader Blow Guns—drop forged stainless steel or brass . . . button type . . . lever type . . . adjustable nose . . . flexible nozzle . . . angle nozzle are available.

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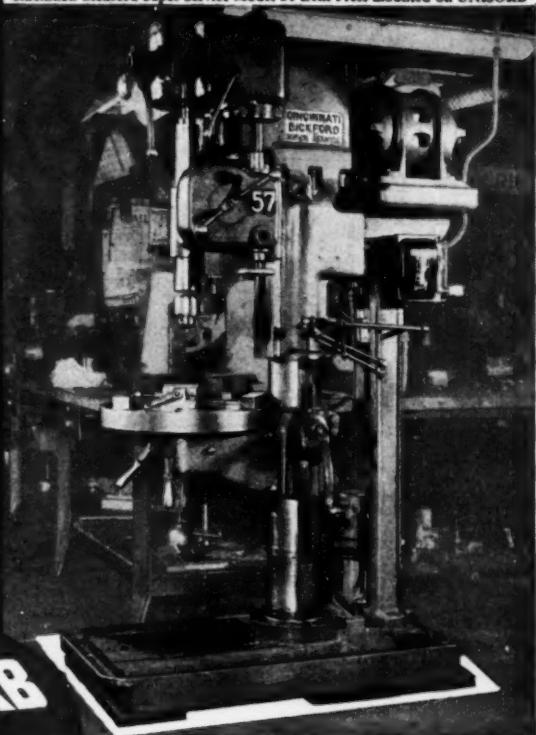
Cincinnati Bickford Super Service Model 21 Drill Press mounted on UNISORB

*Reduce
Vibration...*

*End Needless
Floor Damage*

**ANCHOR ALL
MACHINERY
ON**

UNISORB



NO BOLTS...NO LAG SCREWS...NO FLOOR DRILLING

UNISORB... the modern way to mount machinery... gives you 3 distinct advantages:

1. **ENDS NEEDLESS FLOOR DESTRUCTION**—As UNISORB requires no bolts or lag screws, there's no longer any need for destructive floor drilling to anchor machinery. Permanent set prevents riding.

2. **SAVES INSTALLATION LABOR COSTS**—Installation operations are reduced in number, simplified in method when you "Mount It On UNISORB."

3. **REDUCES COSTLY VIBRATION DAMAGE**—Because UNISORB absorbs from 60% to 85% of transmitted vibration and noise, it saves floors... saves buildings... saves the machinery

itself from harmful results of its own transmitted vibration!

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MOUNT YOUR MACHINERY ON UNISORB ANCHORING PADS

Some TAFT-PEIRCE Shortcuts to **PRECISION** in Production and Inspection



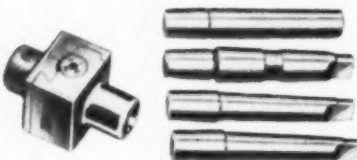
T-P PRECISION LEVELS

measure variations from the horizontal in calibrations of either .0003" or .0005" per foot. Supersensitive and extra-sturdy, adjustable level beam permits self-checking.



T-P BENCH CENTERS

simplify inspection work. Have unusual rigidity and permanent accuracy. This is typical of a wide range of inspection tools available at Taft-Peirce.



T-P OFFSET BORING HEAD

speeds accurate boring of light machine parts or special tools. Adjustable cross-slide has $\frac{3}{8}$ " travel from center. Cross-slide screw is graduated in thousandths. Available with standard or special shanks.



T-P ANGLE BLOCK & SINE BAR SET

simplify setup and grinding of small angular work on a magnetic chuck. Angle Blocks can produce any angle from 0° to 90° by quarter degree increments. Can be used individually or in any combination to form V-Blocks.



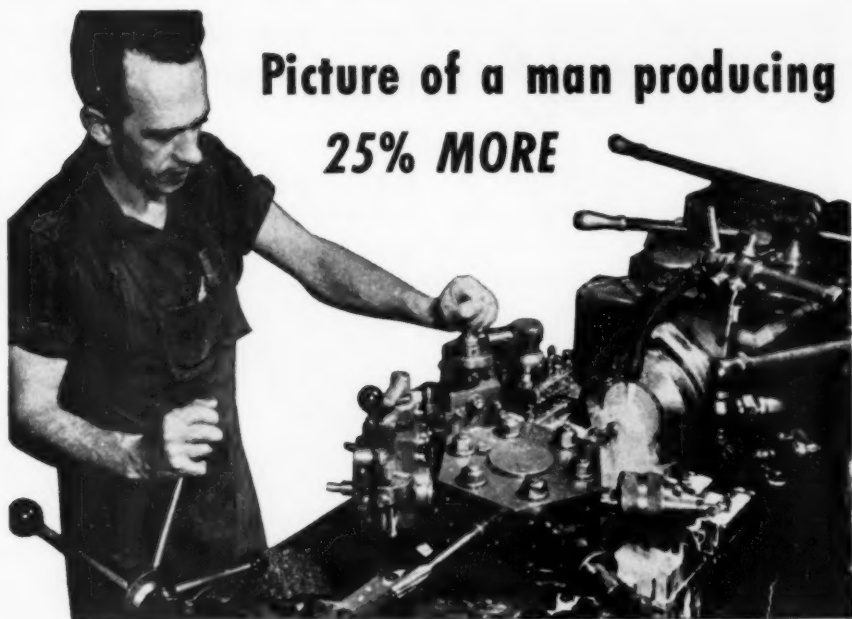
T-P ADJUSTABLE T-PLATE

makes quick work of locating angles accurately on machine tables. Vernier scale reads within 5 minutes of angle. Available in standard size tongues for conventional T-slots. Special tongues made to order.

For the complete story on these items and many more, get your copy of the new Taft-Peirce Handbook, just off the press.



**THE TAFT-PEIRCE
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**Picture of a man producing
25% MORE**

SAME JOB, SAME OPERATION

but better tools!

● Electrol Incorporated, of Kingston, New York, transferred this precision Stop-Plunger job to a Warner & Swasey No. 3 Universal Turret Lathe because it had the speed and accuracy required, as well as the proper tooling for the job. The result was a 25% increase in production of this high pressure hydraulic control part.

This shop has found it can do more jobs faster on Warner & Swasey Turret Lathes with the Standard Tooling Setups that fit their requirements. Multiple and combined cuts, with shorter setup time, mean profitable production increases.

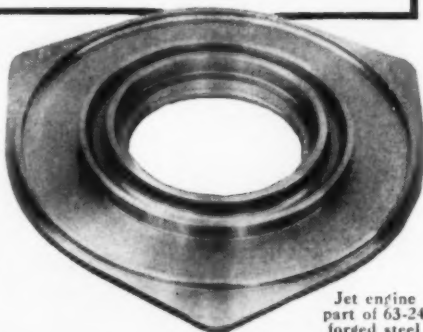


YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATHES, AUTOMATICS AND TAPPING MACHINES

Lusol BOOSTED TOOL LIFE FROM 2 PIECES TO 8

Dense smoke and the constant threat of fire forced them to abandon straight cutting oil. But production suffered with all six of the emulsions they tried, because tool life dropped to two pieces per tool grind. Then they put in a 20:1 solution of Lusol*.

All smoke disappeared and tool life jumped to eight pieces per tool grind—often higher. So they adopted Lusol for all their Warner & Swasey lathes. Finish is fine and the workers are delighted with the cleanli-



Jet engine
part of 63-24
forged steel

ness Lusol has given them. Coolant costs were reduced from \$.48 per gallon, plus tax, to less than \$.10 per gallon with Lusol in the machines.

*Lusol is not an emulsion. It's a solution. There's a big difference.



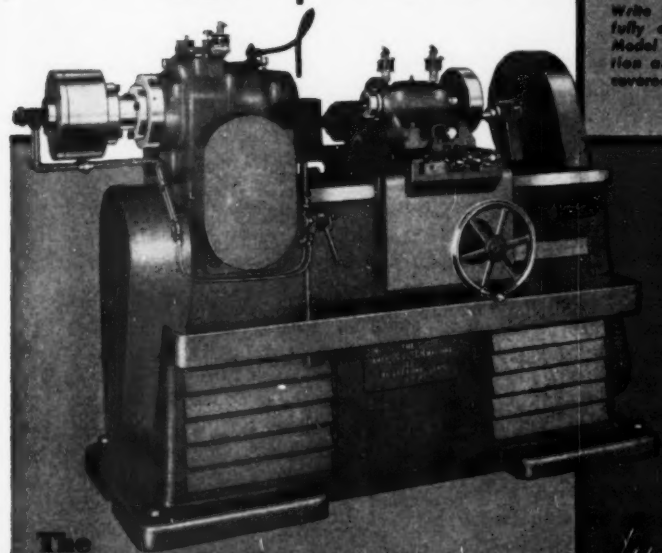
FREE BOOK

Get complete facts about Lusol by writing for this 20-page booklet. It contains information on machine cleaning, maintenance of Lusol solutions, elimination of dermatitis and odor in machines, plus many case histories of Lusol at work. Write F. E. Anderson Oil Company, 217B, Portland, Conn.

Threaded pieces produced
FASTER...automatically
with the improved model H1

**James
Coulter**

HOB THREAD MILLING MACHINE



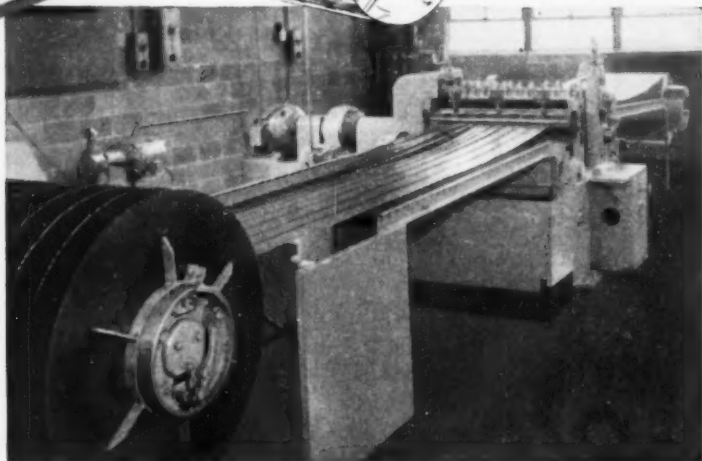
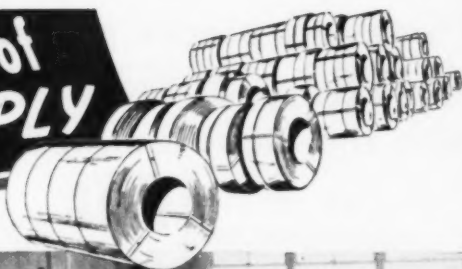
The
James Coulter Machine Co.
BRIDGEPORT, CONNECTICUT

Here is the ONE machine for exacting threading as required in today's speed-up of production. Only the Coulter provides even greater ranges of speeds and feeds — high speeds for non-ferrous metals, slow speeds for heat treated materials. A special high speed drive-to-work spindle permits control of light facing cuts or indicating the work before threading. Quick change-over for short runs. All motors are enclosed, yet easily accessible.

Write for illustrated booklet fully describing the Coulter Model H1. Detailed information and specifications are covered completely.



Better Control of STRIP SUPPLY



● If you use over 100 tons of strip per month, in special widths, a Yoder Slitter will bring welcome relief from strip supply difficulties.

Mill-width strip is more easily obtained, from numerous sources, and at lower cost. A saving of ten to twenty dollars per ton is quite common, soon paying for the slitter investment.

With a flexible stock of mill-widths

of the desired gauges, you no longer need to anticipate requirements for special widths far in advance. Your production planning becomes much easier and the need for big inventories of slit strands disappears when you can supply your own needs on a few hours' notice.

Send for literature on the economics and mechanics of slitter operation. Consultations, estimates, recommendations for the asking.

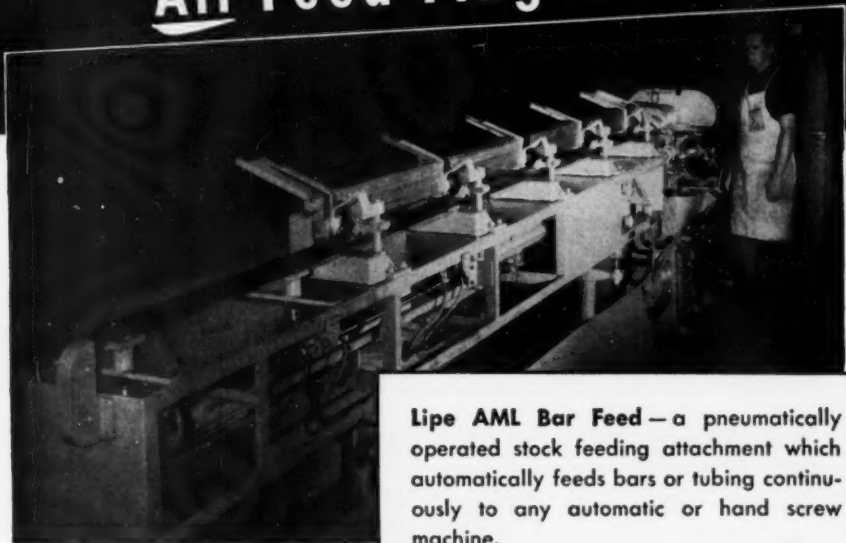
THE YODER COMPANY • 5509 Walworth Ave., Cleveland 2, Ohio

Complete Production Lines

- ★ COLD-ROLL-FORMING and auxiliary machinery
- ★ GANG SLITTING LINES for Coils and Sheets
- ★ PIPE and TUBE MILLS—cold forming and welding



Eliminates **All Feed Finger Costs!**



Lipe AML Bar Feed—a pneumatically operated stock feeding attachment which automatically feeds bars or tubing continuously to any automatic or hand screw machine.

Lipe **Automatic MAGAZINE LOADING BAR FEED**

ELIMINATES FEED FINGERS—A pusher rod *behind* the stock feeds it through the collet. Abolishes feed fingers—saves feed finger replacement and repairs.

ELIMINATES REJECTS—Other than the collet, nothing grips the bar. There's no feed finger scratching, marring or deforming of highly polished stock.

CUTS CYCLE TIME—Eliminates multiple feed finger feed-outs. Feeds stock up to 16" long in one operation. There's no idle operation, no "catting air."

And in addition . . .

- Increases output 30% or more!
- Enables operator to attend many more machines!
- Pays for itself within one year!

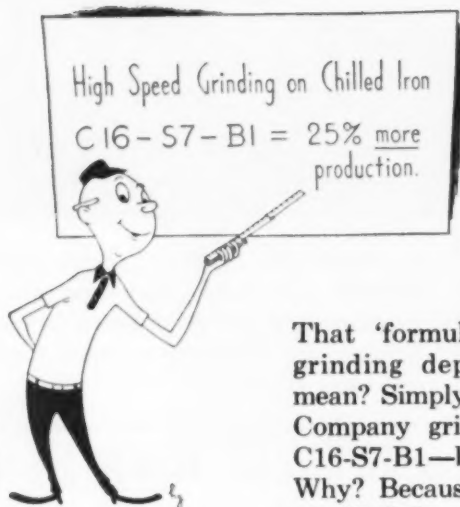
We Stand Back of This . . . Lipe AML Bar Feed will enable your screw machine to produce at least 90% of its gross geared production capacity.



Lipe - **ROLLWAY CORPORATION**

Manufacturers of Automotive Clutches and Machine Tools
Syracuse 1, N. Y.

Here's how the Grinding Department figures it...

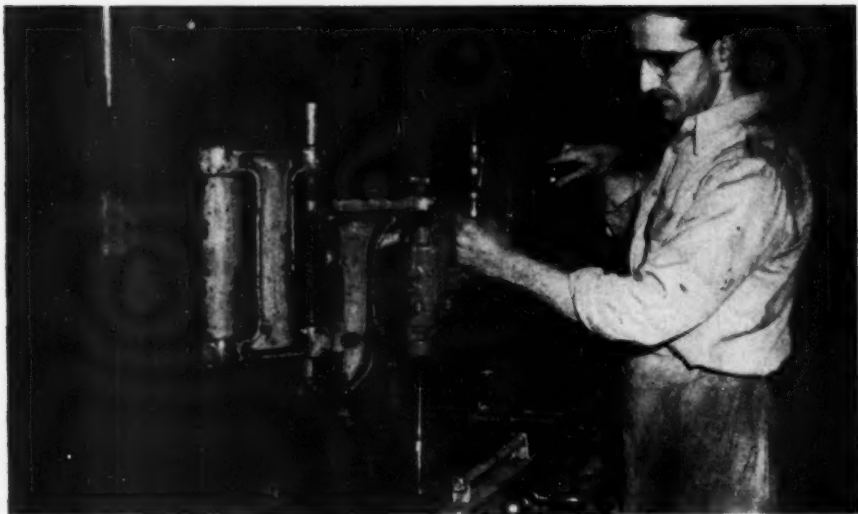


SIMONDS
ABRASIVE CO.
Grinding Wheels

That 'formula' sure paid off in one grinding department. What does it mean? Simply this: a Simonds Abrasive Company grinding wheel—specification C16-S7-B1—boosted production 25%. Why? Because this wheel is accurately specified for the job it had to do. This is true of all Simonds wheel specifications. They're listed in our free data book, along with details on our complete line of grinding wheels, mounted wheels and points, segments and abrasive grain—plus information on how you can get Simonds wheels specially made for out-of-the-ordinary jobs. Write for it. Also name of your nearby distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.



Why have an air motor here?

This fixture is used to drill all types of sheet metal — including stainless steel — for commercial and industrial counters and partitions.

Such severe service — for sixteen hours a day — was too much for the motor previously used. Frequent shutdowns for repairs were upsetting production schedules.

Then a Cleco 101-A Drill motor was installed. This motor has been in service now for over a year *without requiring any maintenance!*

But there was also an additional bonus of increased output. The controllable speed and high stalling torque of the Cleco Air Motor gave operators the extra control they needed to drill holes faster and increase output. Needless to say, the manufacturer is more than pleased with the service he has gotten.

Phone, write or wire your nearest Cleco field engineer. Go over your production problems with him and see how Cleco Air Tools can increase output and cut costs. Do it right away.



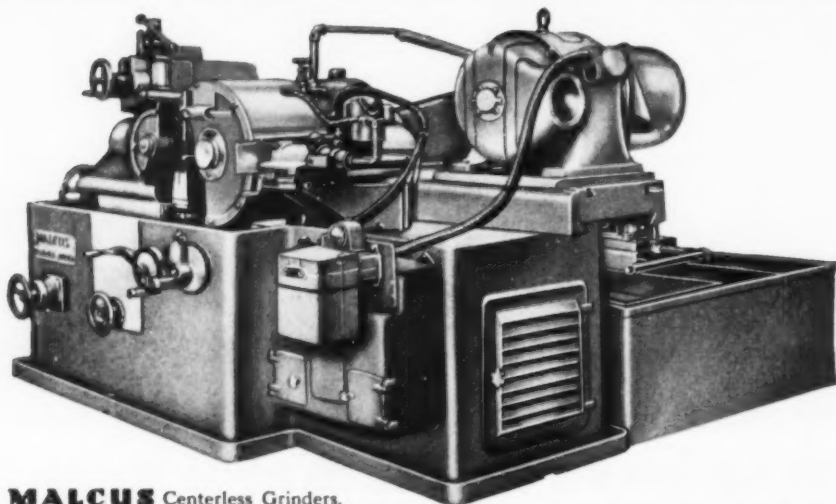
CLECO DIVISION



of the REED ROLLER BIT COMPANY
5125 CLINTON DRIVE • HOUSTON 20, TEXAS

3620

MALCUS CENTERLESS GRINDER



MALCUS Centerless Grinders, made in Sweden, are built to meet the accuracy, production, and versatility required by industry. In addition to in-feed and through-feed operations, these machines, with suitable attachments, can grind tapers or profiles.

CHECK THESE OUTSTANDING FEATURES:

- Strong and rigid construction.
- Adjustable grinding and regulating wheels for handling all diameters within full capacity of machines.
- Main spindle supported by long, plain bearing.
- Automatic, circulating lubrication system for main bearing.
- Feeds can be adjusted rapidly during grinding operation. Regulating wheel has individual drive and controls.
- Micrometer adjustment of regulating wheel and its dressing device provides for a higher degree of grinding accuracy.
- Marks on bars are eliminated by floating rollers on feed tables.

TYPICAL GRINDING RESULTS:

Straightened bars from 3/16" to 5/16" in diameter, with a stock removal of .010" to .020", can be finish ground in one pass at a speed of 25 to 30 feet per minute.

GRINDING CAPACITIES				
Type	MC2*	MC3	MC4	MC5
Largest Diameter	2 3/8"	2 3/8"	6"	6"
Smallest Diameter	.004"	.004"	.020"	.020"
Max. Length-In-feed	5 7/8"	5 7/8"	9 7/8"	10-7/16"

*Type MC2 is designed mainly for in-feed grinding. Construction differs from other types.
Grinders can be equipped with regular and automatic bar feed tables, hopper feeds, or special feeding devices.

FOR COMPLETE DETAILS WRITE TODAY

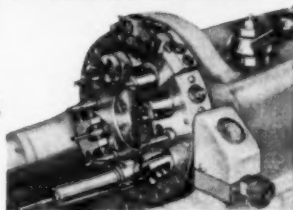
COSA CORPORATION
403 Lexington Ave., New York 17

Your source for all Precision Machine Tools—
from Small Bench Lathes to Large Boring Mills

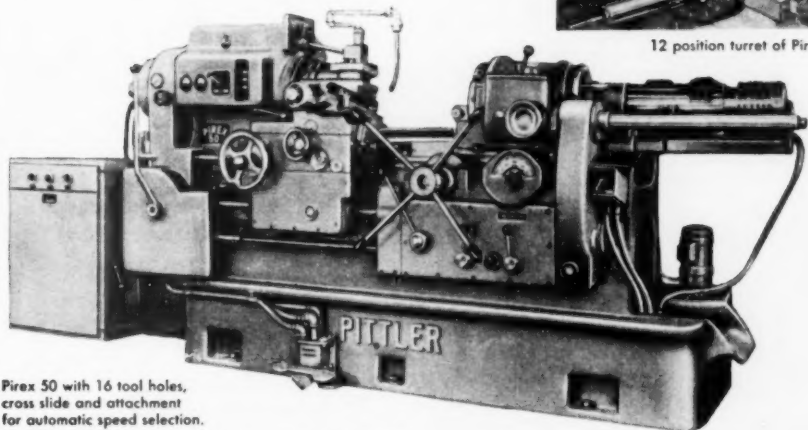
IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 33, Mich.

PIREX TURRET LATHES

with
12 or 16 Turret Tool Holes



12 position turret of Pirex 32



Pirex 50 with 16 tool holes, cross slide and attachment for automatic speed selection.

Meet your increased turning demands with PIREX Turret Lathes. Built by Pittler, manufacturers of turret lathes for over 60 years, PIREX Lathes have all the latest engineering features for maximum output . . . 12 or 16 tool holes to reduce set-up time . . . Powered with motors up to 12 hp for high speed cutting with carbide or high speed tools.

Rigid construction for high surface finishes . . . Ample speeds and feeds . . . Patented speed selector for instantaneous selection of spindle speeds . . . Gears are changed automatically by magnetic clutches . . . Coarse, medium or fine feeds have stepless, variable adjustments within each range.

Principal Specifications

	PIREX 32	PIREX 50
Bar capacity	1.25"	2"
Swing over bed	14"	15.7"
No. of Tool Holes	12	16
No. of Spindle Speeds	16	11
Spindle speed R.P.M.	71-1800 90-2250	18-1800
Feeds — Longitudinal and transverse		
Fine i pr	.001"-.009"	.001"-.009"
Medium i pr	.002"-.020"	.002"-.020"
Coarse i pr	.004"-.040"	.004"-.040"

SEND FOR CATALOG DESCRIBING PIREX TURRET LATHES

COSA CORPORATION
405 Lexington Ave., New York 17

Your source for all Precision Machine Tools—
from Small Bench Lathes to Large Boring Mills

IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Cousens Highway, Detroit 35, Mich.

SOUTH BEND

Lathes • Drill Presses • Shapers for More Efficient Machining



ENGINE LATHES



TOOLROOM LATHES



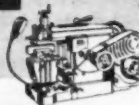
TURRET LATHES



DRILL PRESSES



SHAPER



ACCESSORIES



Send for this New Catalog

This new South Bend catalog contains illustrations, descriptive material and specifications of all sizes and types of South Bend Lathes, Drill Presses and Shapers. It also shows the complete line of South Bend accessories, chucks, tools and attachments. Complete in every detail, this catalog is a valuable reference book which every shop man should have. Send for your free copy today.

PARTIAL LIST OF CONTENTS:

Engine Lathes — 9", 10", 13", 14½", 16" and 16-24" swing. **Bench Lathes** — 9" and 10" swing in standard change gear, quick change gear and toolroom models. **Toolroom Lathes** — 10", 13", 14½" and 16" swing. **Turret Lathes** — ½" collet — 9" swing; 1" collet — 10" and 16" swing. **Drill Presses** — 14" capacity Precision and Economy models; also multiple head Production models. **Shaper** — 7" bench model with or without stand. **Accessories** — for lathes, drill presses and shapers.

SOUTH BEND LATHE, South Bend 22, Ind.
Please send Catalog 5205. I'm particularly

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Name _____

Company _____

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"WELD-EDGE"

Power Hacksaw Blade

It's
Shatterproof!



BEND IT...



TWIST IT...

IT'S TOUGH...
AND LONG-LASTING!



DROP IT...



STEP ON IT...



HAMMER IT

Here's a Power Blade especially designed to meet all plant safety and performance requirements. A blade so tough it will not snap in operation regardless of abuse, neglect, worn machine condition or improper adjustment. A blade that has a high speed steel cutting edge that resists wear and is adaptable for all types of cutting.

With "Weld-Edge" there will be fewer blade-changes, longer blade life. This means more cuts per blade, higher out-

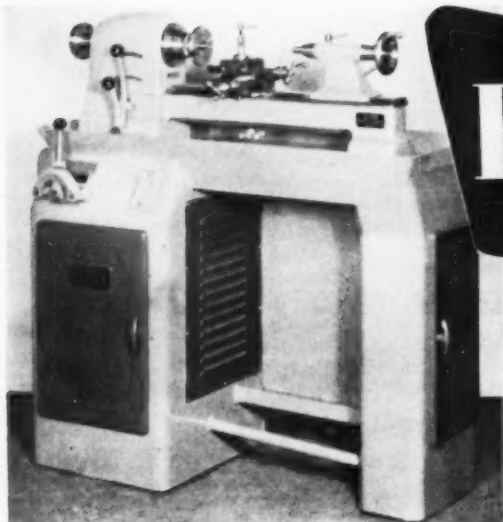
put per machine and a definite reduction in production costs.

So for safety, dependability and increased output at lower cost, get SIMONDS "Weld-Edge" Blades from your Industrial Supply Distributor. All standard sizes available from stock.

SIMONDS
SAW AND STEEL CO.

HIGH SPEED STEEL

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que.
Southern Service Shop in Meridian, Miss. (formerly J. H. Meese Saw Mfg. Co.).
Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.; Simonds Abrasive Co., Phila., Pa. and Arvida, Que., Canada



ELGIN LATHES

MODEL EPL-5C STEEL PEDESTAL BASE

Knee Hole Bench affords operator utmost comfort and convenience directly in front of work. Variable speed drive provides stepless speeds 120 to 3780 R. P. M. Built-in cabinets of ample size for collets and other tools. Collet capacity 1". Nine-inch swing.

TOOL ROOM PRECISION WITH PRODUCTION SPEED

You can depend on it when you use Elgin Lathes for smaller types of work that must be finished to close tolerances. They are designed and built with sturdiness to insure precision operation at production speeds.

Elgin Lathes are available in a variety of designs for special applications and with different bench types.

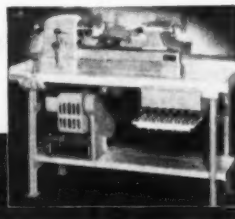
ELGIN LATHE MODEL EL, WITH LAMINATED WOOD BENCH

Designed specially for Tool Room work with extra bench space. Extra strong and rigid. Bench top is 2 1/4" laminated seasoned hard maple and thoroughly re-inforced. Lathe specifications, same as shown above.



HAND SCREW MACHINE

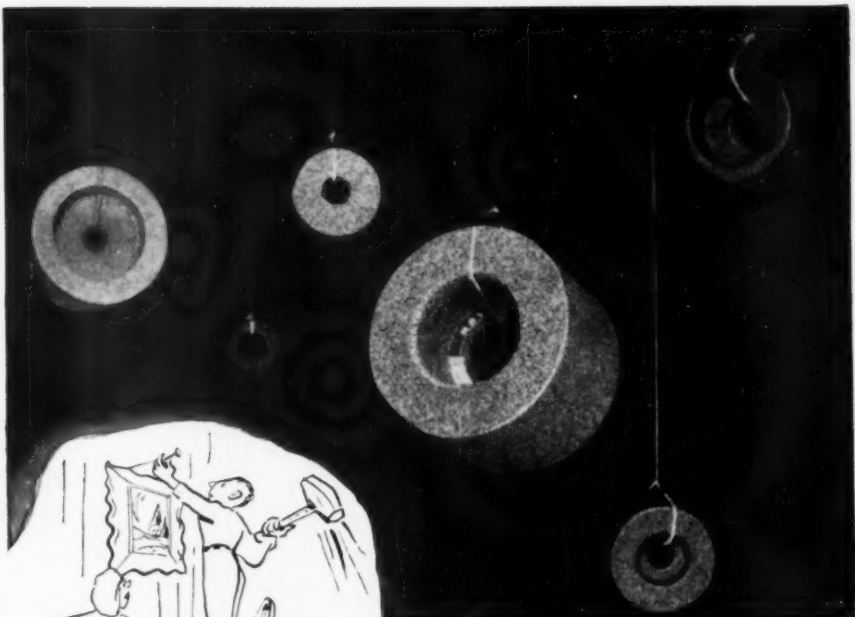
With steel pedestal base. Spindle speeds 120 to 3780 R. P. M. with Variable Speed Drive. Any speed quickly available without stopping spindle. Directly reversible. Collet capacity 1". Nine-inch swing. Two-speed motor, 3/4-3/4 H. P. Coolant system mounted in back and outside for convenience.



ELGIN TOOL WORKS, INC.

1772 BERTEAU AVENUE

CHICAGO 13, ILLINOIS



YOU COULD HANG PICTURES with a sledge hammer...

but... you shouldn't — nor should you use just any internal grinding wheel when you can use Bay State's... proven best in the field for the countless inside grinding jobs that call for speed and accuracy.

Deservedly popular, Bay State Internal Grinding Wheels are:

- **UNIFORM** — due to exacting standards of manufacture
- **TRUE-RUNNING** — because of accurate centering
- **LONG-LASTING** — because they fit-the-job,

through the proper selection of grit and grade.
(That's where Bay State engineering experts will really help you.)

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Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All Principal Cities
In Canada: Bay State Abrasive Products Co.
(Canada) Ltd., Brantford, Ontario



BAY STATE





MILLER

High Pressure

STANDARD LEATHER CUP SEAL ASSEMBLY
INTERCHANGEABLE WITH STANDARD PISTON RING



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To Meet Your

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Cylinder Requirements

... now assured by our modern new plant with greatly expanded facilities — devoted exclusively to the manufacture of quality cylinders.

Write for illustrated cylinder bulletins A-105 and H-104.

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1½" to 20" BORES, 200 PSI OPERATION, LOW PRESSURE HYDRAULIC CYLINDERS, 1½" to 6" BORES, FOR 500 PSI OPERATION, 8" to 14" BORES FOR 250 PSI, HIGH PRESSURE HYDRAULIC CYLINDERS, 1½" to 12" BORES, 2000-3000 PSI OPERATION, ALL MOUNTING STYLES AVAILABLE.



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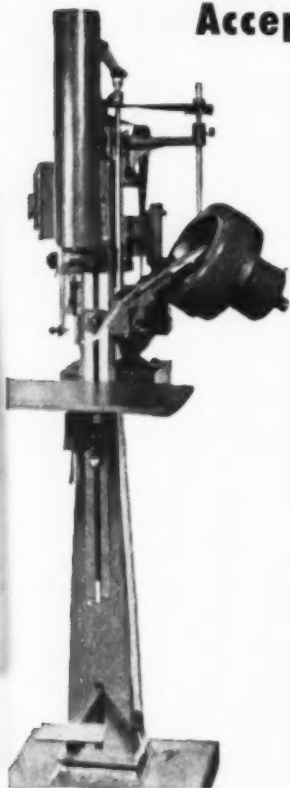
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We are in an enviable position whereby we can deliver the answer to your assembly problem in the form of a particular piece of equipment designed especially for your needs . . . We can do it NOW—not maybe—some time in the future. Though generally speaking, deliveries throughout industry are uncertain, and this situation probably may continue for some time, our position is different . . . We have marshalled our resources and facilities in a way whereby we can positively assure the execution and delivery of your orders without delay.

DETROIT POWER SCREWDRIVERS, HOPPER FEEDING UNITS

NUT DRIVERS, SPECIAL ASSEMBLING MACHINES

Thousands of manufacturers have profited through greatly stepped-up production as a result of our service. You, too, can benefit by the use of D. P. S. power-driven machines. Get further details. Also send sample assembly for production estimate.

DETROIT POWER SCREWDRIVER CO.

2809 W. FORT ST.

DETROIT 16, MICH.

Tap breakage reduced to-



A Warner & Swasey No. 10 Precision Tapping and Threading Machine tapping four tiny Class 3 holes in the type cap piece for National Adding Machines (shown $\frac{1}{3}$ size at right).

**ONE TAP
PER
15,000
PARTS!**



THAT'S the record of the Warner & Swasey No. 10 Precision Tapping and Threading Machine at The National Cash Register Company, Adding Machine Division, Ithaca, New York. The job consisted of tapping four tiny holes for No. 1-72 pitch threads to Class 3 fits on one small part in the adding machine's precision mechanism.

This operation was previously done on a drill press rigged with a tapping head. Tap breakage, despite operators' skill and care, averaged 20 taps a week with 7,000 parts produced.

But when the job was transferred to a Warner & Swasey, 15,000 parts were

tapped with only 1 broken tap. The production bottleneck was quickly broken when production was upped from 175 to 300 pieces per hour.

For this company, the No. 10 was a real investment. Wherever your operations require precision tapping of Class 3 or 4 threads on a production scale, you can depend on Warner & Swasey Precision Tapping and Threading Machines to reduce tap breakage, and practically eliminate costly rejections of parts due to inferior tapping in the final operations.

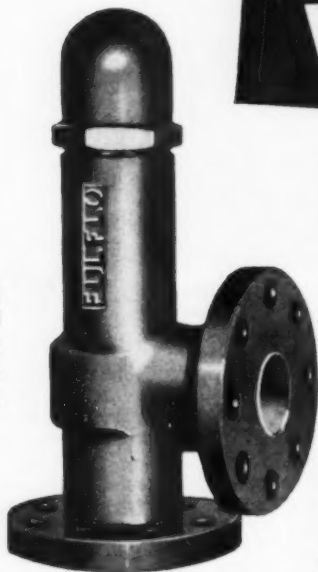


YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURNEY LATHES, AUTOMATICS AND TAPPING MACHINES

Engineers agree that the
BEST designs are the
SIMPLEST

**EFFICIENTLY
SIMPLE**

**BRASS OR
CAST IRON**
Standard
or Flange
Types



OIL BY-PASS RELIEF VALVES

To maintain specific, pre-determined pressures on machine tool hydraulic mechanisms, ram presses, Diesel and oil burning equipment.

**NON-CHATTERING . . . NO MAINTENANCE.
INSTALL . . . THAT'S ALL**
for pressures from 0 to 500 lbs.
Pipe sizes from $\frac{1}{8}$ " to 2".

WRITE on your letterhead for your personal, professional copy of valuable, information-packed

**FULFLO MECHANICAL
DATA BOOK**



THE FULFLO SPECIALTIES CO. Inc.
BLANCHESTER, OHIO

Continental's 1-A Field Set



**A HAND-DETACHABLE
COUNTERBORE SET
SPECIALLY ARRANGED
FOR THE ARMED FORCES**



To meet the specific needs of the Army, Navy, and Air Corps Continental offers this 1-A Field Set, consisting of 13 cutters for counterboring and spot-facing, 17 pilots, and two counterbore holders. Cutters are hand-detachable even after the heaviest cuts, due to Continental's unique balanced drive. Continental also

offers three standard sizes of counterbore sets for toolrooms, machine repair departments, experimental departments, and general shop use. Order through your local Ex-Cell-O representative or write today to Continental Tool Works in Detroit.



Continental's complete catalog is yours for the asking. Write on your company letterhead today.

CONTINENTAL TOOL WORKS

DIVISION OF EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

52-8

**NOW...FASTER SET-UPS...GREATER
ACCURACY IN ANGULAR GRINDING...**

Magna-Lock **SINE**

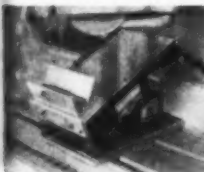


WHAT IT IS:

Magna-Lock Sine is a specially designed electro-magnetic chuck for making precision angular set-ups on surface grinders. Standard gauge blocks insure accuracy that's impractical to attain by other means. No dials, no scales... the only moving part is a simple, rugged, precision-made hinge.

WHAT IT DOES:

Whether a set-up requires single or compound angles, with Magna-Lock Sine they can be made in minutes, saving hours of set-up and machine-time. Magna-Lock Sine's powerful magnetic attraction holds work securely, minimizes distortion or warpage during the machining operation.



Send *now* for full details on Magna-Lock Sine, developed by MAGNA-LOCK
... first to increase your machine's productivity. Write Dept. MT-92.

Magna-Lock

MAGNA-LOCK, INCORPORATED

Magnetic Chucks and Devices

BIG RAPIDS, MICHIGAN, U. S. A.

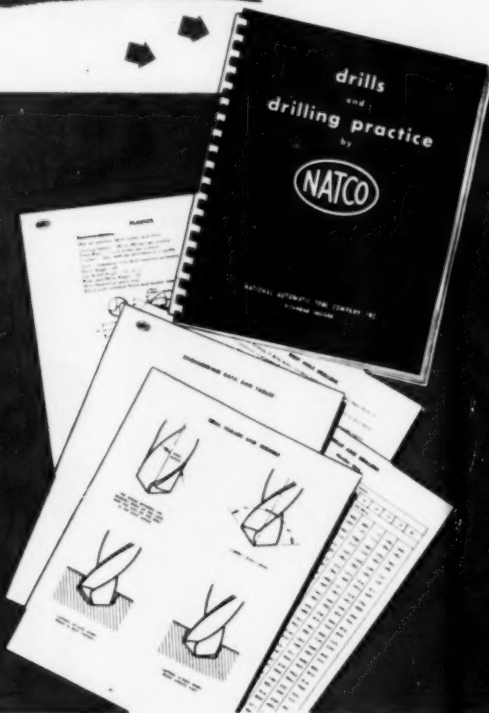
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Engineering Department
NATIONAL AUTOMATIC TOOL COMPANY
Richmond, Indiana

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590 South Mill St., New Castle, Pa.

Catalog on
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General Purpose
Cast Bronze



Electric Motor



Lead alloy
Self-lubricating



Cast Bronze
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Sleeve Type

Specify **POPE**

2500 SERIES—HEAVY DUTY MOTORIZED SPINDLES

for YOUR

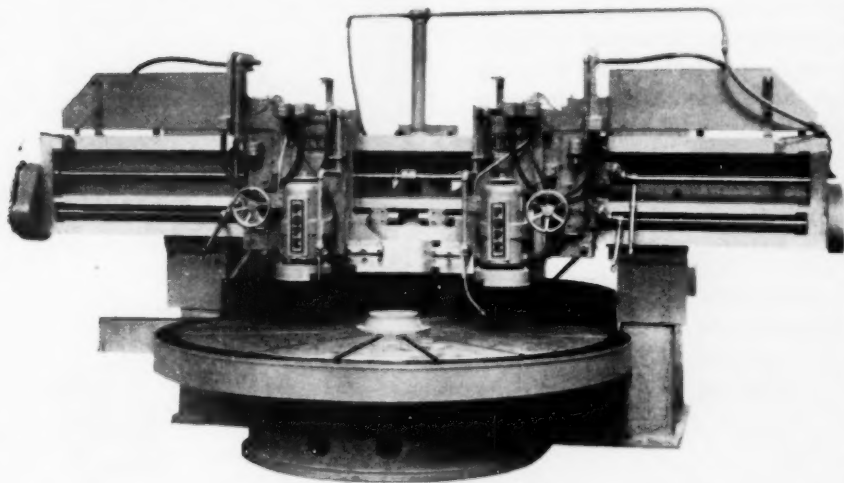
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**AND OTHER
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SELECTED POPE 2500 SERIES SPINDLES for several of their high production machines such as the 120" Niles Boring Mill Type Grinder shown below.



For continuous production of accurate parts and for trouble-free operation, install

POPE PRECISION SPINDLES

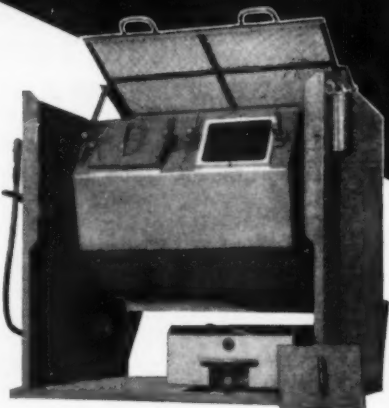
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finishes
mechanically...
at lower cost

The original Roto-Finish processes can effectively convert your precision finishing operations from costly hand methods to a low cost mass production mechanical process. Only at Roto-Finish can you get the recommendations of the engineers who developed the processes for precision barrel finishing and have continued to improve them for more than a decade . . . results guaranteed to be the same in your plant as in our laboratory.



DW 45-36-2

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Speeds up the production and efficiency of descaling, and surface improvement operations, because you finish more parts at one time and use less manpower.

Cut finishing costs as much as 80%.

Mechanically produces uniformly fine finishes to exact tolerances.

Reduce maintenance expenses.

A copy of this fact-packed catalog is waiting for you. Write today.



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C O M P A N Y

P.O. Box 988 —
Phone 3-5578

MODERN PRECISION TOOLS

MODERN
COLLAPSIBLE
TAPS



Modern Self-Opening Die Heads are available in both stationary and rotary types. The stationary type is made in a range of sizes with capacity for cutting straight threads from $\frac{1}{8}$ " to 7", and $\frac{1}{8}$ " to 6" for pipe threads.

MODERN
SELF-OPENING
DIE HEADS



Of unusually simple design with a minimum number of parts and no complicated mechanisms, this new Modern Collapsible Tap Style A-A helps meet industry's demand for faster, lower cost production. It is made in a wide range of sizes with adequate capacities for cutting straight threads and straight and taper pipe threads. All parts are of properly hardened steel, ground and precision fitted.

Modern Self-Opening Stud Setters are positive and entirely automatic in action, and can be operated in any position with either air or electrically driven portable tools. Also equally effective in drill presses where it is possible to drill and tap the holes and set the studs in successive operations. Made in two sizes $\frac{1}{2}$ " and $\frac{3}{8}$ " capacity.

Modern-Magic Quick Change Chuck and Collet Equipment virtually eliminates costly idle time usually present in revolving spindle operations. Tools are changed without stopping or even slowing the spindles. Modern-Magic Chucks are made in 6 sizes and two types: friction drive and positive drive. Modern-Magic Collets are available in a broad range of both standard and special types.

Modern Medium Duty Face Milling Cutters are of blade backed design, and are made in axial and radial types. Standard Modern axial type cutters are available in diameters from 4" to 24" Standard radial type cutters from 8" to 24" diameters. All blades, wedges and screws are interchangeable in all Modern Cutters regardless of diameters.

MODERN-MAGIC
CHUCKS AND
COLLET
EQUIPMENT

Detailed information covering any Modern Precision Tool in which you are interested will be furnished promptly upon request. Let us show you how Modern Precision Tools can help to speed up your production and reduce your costs.

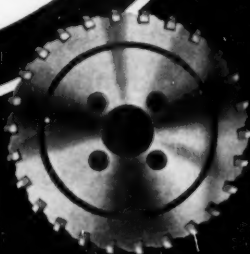
**Modern Precision Tools
Include**

- STATIONARY SELF-OPENING
DIE HEADS
- ROTARY SELF-OPENING
DIE HEADS
- STATIONARY
COLLAPSIBLE TAPS
- ROTARY
COLLAPSIBLE TAPS
- MODERN-MAGIC
CHUCKS AND COLLETS
- SELF-OPENING
STUD SETTERS
- INSERTED BLADE
FACE MILLING CUTTERS
- SOLID ADJUSTABLE
DIE HEADS
- ADJUSTABLE HOLLOW
MILLING TOOLS
- UNIVERSAL CHASER
GRINDING FIXTURES

MODERN
SELF-OPENING
STUD SETTERS



MODERN
FACE MILLING CUTTERS



Modern Precision Tools are produced by the originators of the Modern-Magic Quick Change Chuck and Collet Equipment.

MODERN TOOL WORKS

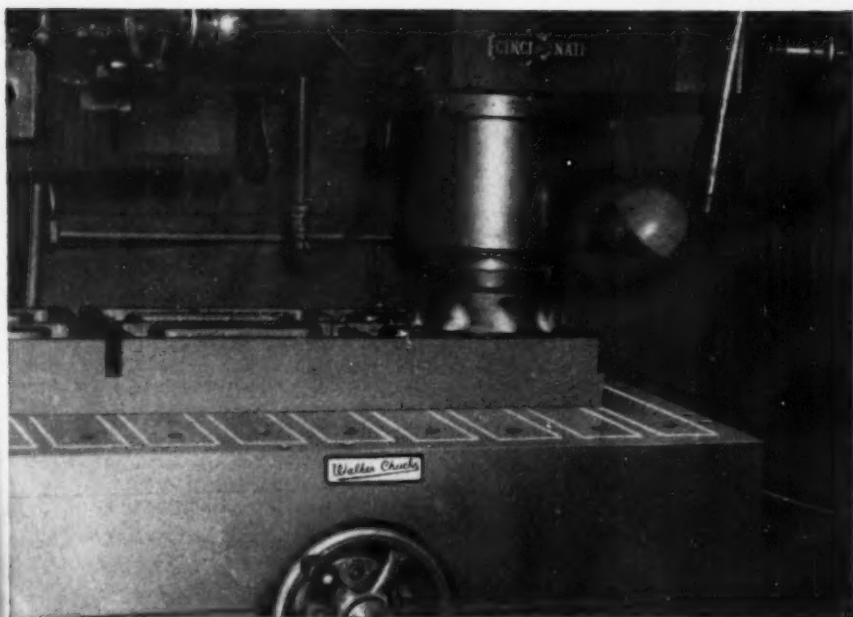
DIVISION

CONSOLIDATED MACHINE TOOL CORPORATION

SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

ROCHESTER, NEW YORK

Walker Does It Again—

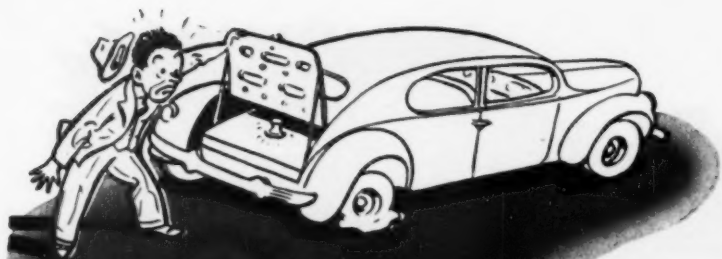


Milling machine operating a carbide cutter 660 f.p.m.; table feed 25 i.p.m. on rough steel castings. Walker Magnetic Chuck, securely holding workpiece, increases production equivalent to work of four planers. Take advantage of modern Walker methods for increasing production, reducing cost.

O. S. WALKER CO. Inc.

WORCESTER 6, MASSACHUSETTS

Original Designers and Builders of Magnetic Chucks



WOULD YOU DRIVE WITHOUT A Spare?

"Just my luck! A flat tire and no spare! What a predicament!"

A machine shop foreman may be in a worse predicament without a spare arbor. When an arbor breaks, production ceases until the arbor is replaced. Machine and manpower hours wasted! Schedules disrupted! Deliveries delayed! That's why we say —

It Pays to Have Several Arbors in Stock

Arbors are "perishable tools" and today their cost is relatively small in comparison to lost hours and disrupted schedules. So play safe! Order your spare arbors today. Remember, Kempsmith Arbors are now available in all popular sizes and types, adaptable to any make of milling machine with standard spindle.

THE KEMPSMITH MACHINE CO., 1827 S. 71st Street, Milwaukee 14, Wisconsin

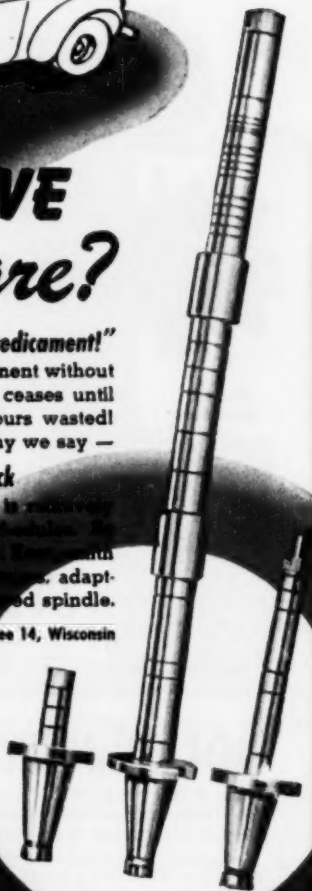


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Describes the complete Kempsmith line of Arbors and Accessories. Gives you helpful information on how to keep your arbors in condition. Free on request. Mail coupon — today. No obligation.

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BY

KEMPSMITH



A 4594-1PCA-R

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LEADER
OF ITS
CLASS!**

PRESS-RITE

**MODEL O 5 TON
POWER PRESS**

Compare it...

FEATURE FOR FEATURE!

- **HEAVY UNI-CAST FRAME**
Provides greater strength and ruggedness, for continuous 5 ton operation.
- **GREATER SHUT HEIGHT**
Full 7" to permit use of large bulky dies
- **4 POINT SLIDING KEY CLUTCH**
Eliminates lost flywheel motion and power. Increases production.
- **NON-REPEAT SINGLE STROKE SAFETY MECHANISM**
Builds operator confidence. Reduces rejects. Steps up output.
- **AUTOMATIC CAM ACTUATED BRAKE***
Instant braking at top of stroke. Full energy instantly on next stroke.
- **ANTI-FRICTION ROLLER BEARINGS***
Eliminates flywheel drag. Provides smoother action, and longer life.
- **OPEN BACK INCLINABLE**
Construction just like the larger Press-Rite Presses.

**Up to
30%
HEAVIER**

**MODEL O
Bench Model**



MODEL O Floor Model

**For
BLANKING
PUNCHING
FORMING
STAMPING**

NOT JUST ANOTHER 5 TON PRESS...

but a 5 ton press with features you'd expect to find only in larger presses . . . at much higher cost!

See this press. Use it! You'll agree you never had a press that could compare with it feature for feature . . . or match its outstanding performance.

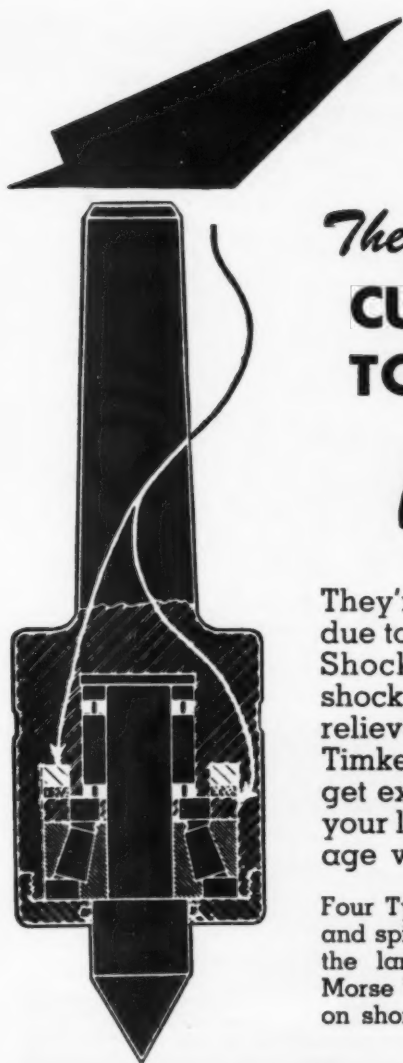
See it at your dealer or write for Bulletin 552.

Sales Service Machine Tool Co.

PRESS RITE PRESSES • SHAPE RITE SHAPERS • KELLER POWER HACK SAWS

2357 UNIVERSITY AVENUE • ST. PAUL 4, MINNESOTA





These Shock Absorbers **CUT** **TOOL BREAKAGE**

Glenzer
PRECISION CENTERS

They're cushioned to absorb shock due to heat expansion in machining. Shock breaks tools. Soak up the shock and you reduce tool breakage, relieve excessive pressure on the Timken annular roller bearings. You get extra dividends in longer life for your live centers and less work spoilage with Glenzer Live Centers.

Four Types — Taper shank, slip-over, slip-in and spindle. For smallest tool room lathes to the largest railroad shop equipment. All Morse Tapers in stock. Other types to order on short notice.

THE J. C. **GLENZER** CO. Inc.

1546 E. NINE MILE ROAD, DETROIT 20, MICH.

L-W

SWIVEL BASE MILLING MACHINE VISES

These Vises Can Take It!
THEY'RE BUILT FOR
BRUTE STRENGTH
AND ACCURACY
yet are

Really Low Priced!

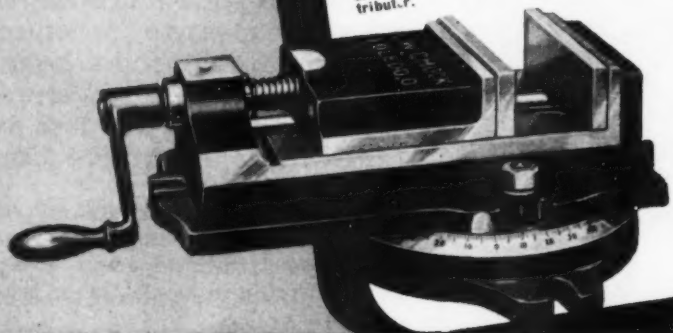
Ideal for drill press and shaper work.

High-grade semi-steel castings. Hardened steel sliding jaws with full length bearing on a ground bar and machined ways. The 4½" and 6½" sizes have a large Acme steel screw with replaceable bronze nut. Four bolt and key slots for rigidly attaching to table so that work-holding surfaces are at true right angles or parallel to the table.

MASTER \$54.56
Jaws: 6½" wide, 2" deep. Opens 4" with jaws, 5¼" without. Wt. complete with crank, boxed, 85 lb.

JUNIOR \$36.55
Jaws: 4½" wide, 1¾" deep. Opens 3" with jaws, 3½" without. Wt. complete with crank, boxed 40 lb.

HUSKY \$21.85
Jaws: 3" wide, 1" deep. Opens 2" with jaws. Wt. complete with crank, 16 lb.
Order from Your Industrial Supply Distributor or Order Direct, Giving Name of Your Distributor.



Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products



DYNAMOMETERS



MAGNETIC CHUCKS



DIVIDING HEADS



RECTIFIERS



DYNAMOMETERS



LATHES CHUCKS



UNIVERSAL SHAPERS



POWER BELT DRIVES



MACHINE TOOLS

L-W CHUCK COMPANY

23 SO. ST. CLAIR ST.
TOLEDO 4, OHIO



Check hole sizes



and locations,



find centers,



gage slots,

and dozens of
other uses with
HORBERG

precision taper



Pin Gages

SAVE TIME AND MATERIALS

Oil-hardened tool steel tapered pin gages accurate to $+0.0001'' - 0.0000''$ insure dependable sizing and location of holes and slots for machinists, set-up men, tool and die men, inspectors, all who need precise hole measurement.

CONCENTRIC TAPER on lower half of each gage fits holes $0.0012''$ smaller

than standard letter, fraction, and number size drill holes. Makes insertion easier. Permits gaging of odd-size holes and slots.

ALL GAGES are $1\frac{1}{2}$ inches long. Sets contain a pair of each size in a plastic case with 4-place decimal equivalents of each size plainly marked.

ALL ITEMS STOCKED FOR IMMEDIATE DELIVERY

THE *Horberg* GAGE COMPANY

Quantity 21 STAPLES ST., BRIDGEPORT, CONN.

..... Letter sets @ \$45.
52 gages (A-Z)

..... Fraction Sets @ \$50.
60 gages ($\frac{3}{16}''$ to $\frac{1}{2}''$
in $\frac{1}{64}''$ steps)

..... Number Sets @ \$90.
120 gages (1 to 60)

..... Single gages @ \$ 1.

..... Stand alone @ \$10.

Please Rush checked items and literature to

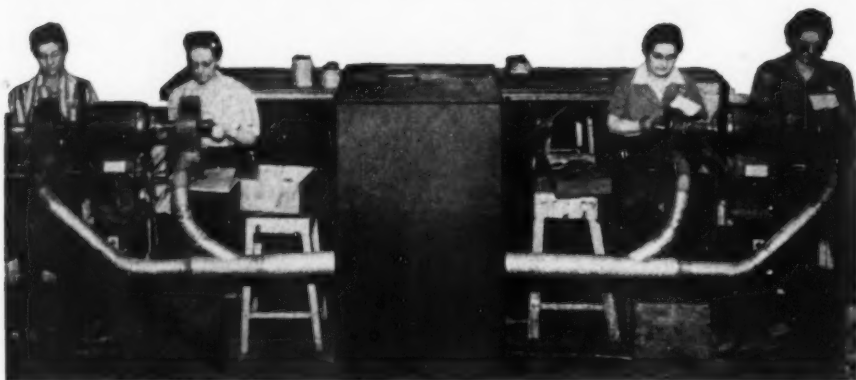
company.....

address.....

name.....

title.....

A TORIT DUST COLLECTOR . . .



at Four to One Still Your Best Bet!

TORIT FB TYPE Dust Separator



Torit also manufactures a line of cyclone type dust separators. Sizes up to 5 H.P., with or without after-filters.

Here four grinding wheels are in constant use finishing small parts, yet this 1½ H.P. Model 81 Torit Dust Collector completely eliminates any abrasive dust hazard to operators or to finished parts.

The efficient, self-contained design of Torit Dust Collectors permits compact set ups like this. There is no work interference, piping is minimized, and operating costs are low because this Torit Dust Collector runs only when the wheels are in operation.

Solve *your* dust problems with Torit Dust Collectors. Models and sizes for standard and special dust-collecting problems. Ask for details and the latest Torit catalog.

TORIT

MANUFACTURING CO.

303 Walnut St.

St. Paul 2, Minn.

NEW

DRILL STOP

by **SJ** SCULLY JONES

End Guesswork and Reduce Rejects:

You often require close control of depth for operations—as in center drilling, drilling and reaming—on turret lathes, radial drills and other machines. On these operations, or wherever a quick change arrangement is used in one station for sequence operations, you hold uniform hole depth by using the new S-J Drill Stops. They provide a positive stop which ends guesswork and reduces rejects.



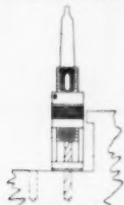
Quick and Easy to Insert, Remove and Adjust Tools:

Simply loosen set screw and slip stop collar from threaded shank for quick insertion or removal of taper shank tools. The threaded lock bushing provides quick and accurate adjustment of the stop collar. Only a quarter turn of the set screw forces the bushing against the shank threads for a positive lock.

Write for
BULLETIN NO. 18-50
for data
on Drill Stops.



**STOPS ON FIXTURE
BUSHING OR WORK**



Work on Close Centers:

The small body diameter permits you to operate these Drill Stops on close centers and near shoulders or other obstructions.

Trouble-Free Performance:

S-J Drill Stops are made from an alloy steel with all points of wear hardened for long life. The four chip grooves tend to break up and remove any chips from the surface on which it stops. Investigate the use of S-J Drill Stops wherever you require a positive control for depth of hole. Made in 8 sizes having Morse Taper shanks and holes.

Scully-Jones
AND COMPANY

1907 S. Rockwell St., Chicago 8, Ill.

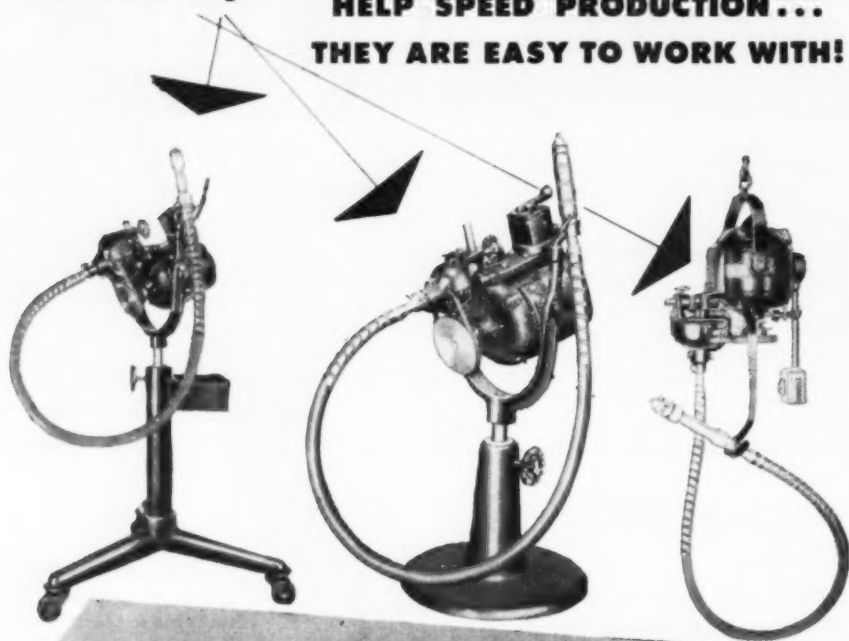
R-5728MT

YOU GET LOW COST FAST ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS



FLEXIBLE SHAFT MACHINES

**HELP SPEED PRODUCTION...
THEY ARE EASY TO WORK WITH!**



Available in a wide selection of models

The Strand line of flexible shaft machines is able to meet requirements with models that fit shop space to best advantage...you can select bench or floor mount or overhead type depending upon your needs. They also meet job requirements for varying H.P. and R.P.M. Strand flexible shaft machines are known for quality and give top performance and trouble

free service. They are long lasting and prove a sound investment. Be sure to review the complete Strand line before you buy.

If your favorite distributor does not handle the line, for further information write to the nearest address shown below.

EASTERN SALES
Woodberry, Baltimore 11,
Maryland

WESTERN SALES
5001 North Wolcott Ave.,
Chicago 40, Illinois

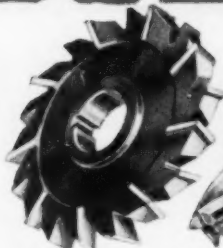
*The Balmar
Corporation*

N. A. STRAND DIVISION

CUTTING TOOLS



Side Milling Cutter —
H.S.S. — Featuring our
Step Tooth



Side Milling Cutter,
Staggered Tooth
H.S.S. with Step
Tooth.



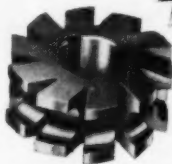
Double End Mill 4
flute — Right Hand
Cut Right Hand
Spiral H.S.S.



Single Angle
Cutter H.S.S.



Convex Cutter H.S.S.
This Cutter is made
in both Standards.



Concave Cutter
H.S.S. This Cutter
is made in both
Standards.

Double End Mill
2 flute Right
Hand Cut Right
Hand Spiral
H.S.S.



F&D

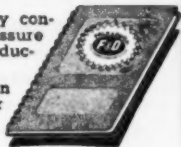
STANDARD AND SPECIAL CUTTING TOOLS

F & D tools are made under the most rigid quality control standards with 100% final inspection to assure positive uniformity and afford large savings in production costs.

The F & D Step Tooth Cutter gives a greater dissipation of heat, makes easier sharpening and makes closer control possible.

The F & D Cutter line is stocked by leading distributors in your area.

Write the factory for our new No. 12 Catalog and current resale price list. Include request for current stock list.



(Several attractive distributor areas are still open.)

THE F & D MACHINE AND TOOL WORKS

THREE RIVERS, MASSACHUSETTS

SOLID ADVICE



Order ATRAX Tungsten Carbide Tools Ground-from-the-Solid

We can prove to you that it pays off to specify ATRAX precision tools ground-from-the-solid. It pays off in longer service, less production difficulties—and that means better profits for you. Send for our complete catalog, or let our engineers consult with you about your needs.

Representatives and Distributors in principal cities in the United States and Canada. Write us for the name and address of our Representative in your area.

THE ATRAX

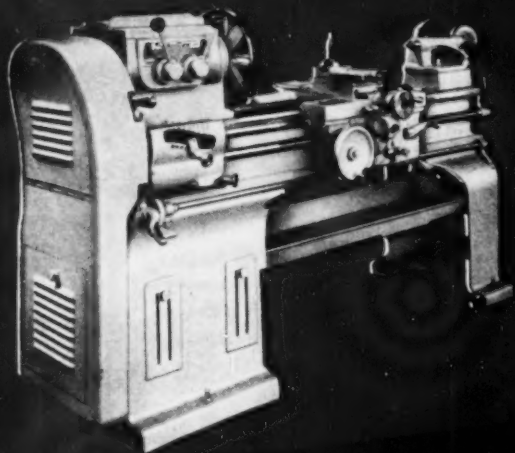


**PRECISION MACHINE GROUND
BURS, REAMERS, END MILLS,
BORING BITS and OTHERS**

Send for complete
catalog NOW!



COMPANY NEWINGTON 11,
CONNECTICUT



Designed

**for
precision
work!**

Sebastian

GEARED HEAD Lathe

**FINER LATHE CONSTRUCTION • GREATER EASE
OF OPERATION • LONGER, ECONOMICAL SERVICE**

Before you buy a general purpose lathe, investigate the medium-priced Sebastian Lathe. It has all the big-lathe features which contribute to consistent accuracy plus time-saving, labor-saving ease of operation.

Precision . . . built-in to last . . . is assured by: Pre-loaded roller bearing supported spindle, bearings on all headstock shafts, oversized heat-treated headstock gears, .0005" accuracy at every alignment point, taper gibs throughout.

Sebastian Lathes invite comparison. Latest literature gives features you should check in any lathe, before making a decision. Write for catalog.

**CURRENT
DELIVERY
8 to 8 WEEKS
PRIORITY
RATING
REQUIRED**

SEBASTIAN LATHE DIVISION

**Cincinnati Metalcrafts, Inc. 5012-J2 Brotherton Road
CINCINNATI 9, OHIO**

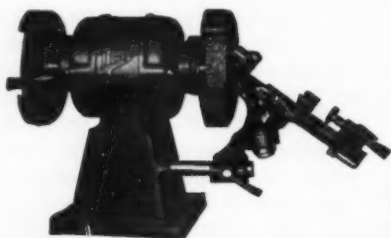
Are you having TROUBLES in your DRILL DEPARTMENT?

Following are some of the most common and their causes:

Trouble	Cause
Oversize holes.	Unequal lip length.
Drill burns—will not cut.	Insufficient clearance.
Cutting edge chips or crumbles.	Too much clearance.
Outer corners of lip break down.	Speed too high.
Excessive wear on margins.	
Rough holes.	Speed too slow or
Drill breakage.	Feed too heavy.
Drill point crushes.	
Broken tangs.	Dirt or chips in socket or
	Worn out socket.

Most of the above can be overcome by using a precision type Drill Grinder. A Hisey Drill Grinder will quickly pay for itself when you consider that drills that are correctly ground and kept sharp will (1) drill faster, (2) drill more holes per grind, (3) drill to exact size, (4) reduce breakage, (5) increase life of drill by removing less metal when sharpening.

A Hisey Drill Grinder will grind drills quickly and correctly with inexperienced operators.

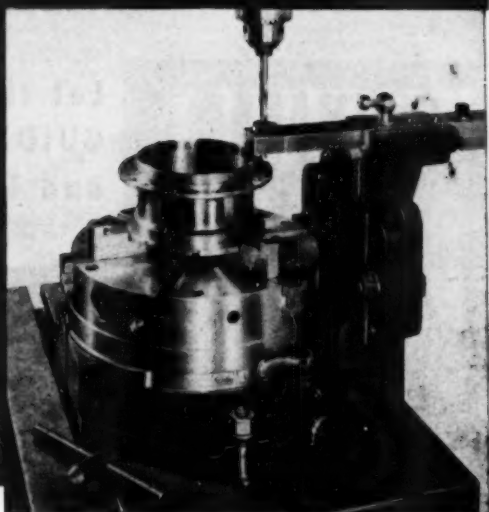


ASK FOR CATALOG 72 BA

It shows more than 200 different types and sizes of Bench and Pedestal Grinders, Buffers and Polishers, Snagging Grinders, Lathe type Grinders, Wet Tool Grinders, Disc Grinders and Dust Collectors.

Hisey THE HISEY-WOLF MACHINE CO.
CINCINNATI 8, OHIO
Division of The Cincinnati Electrical Tool Co.

12" SUPER- SPACER



This versatile tool eliminates expensive jigs and fixtures. It is ideal for both long and short runs. Special chuck can be used either as a faceplate or a chuck. Through hole permits passage of work up to 4" in diameter and allows use of centering plug if necessary.

Illustrated at the left is the Super-Spacer set up to accommodate horizontal axis mounting.

Increase your production . . .

write for new bulletin now!

When it comes to production —

AUTOMATIC
DRILLING
& TAPPING
MACHINES



AUTOMATIC
THREAD
ROLLERS



HARTFORD
Special

THE HARTFORD SPECIAL MACHINERY CO., HARTFORD 12, CONN.

When You Need Pump Replacements...

TUTHILL PUMP GUIDE

A handy check chart to help you select the proper pump for your individual requirements from the dependable line of Tuthill Pumps.



TUTHILL PUMP COMPANY
939 East 95th Street, Chicago 19, Illinois

Let this **TUTHILL PUMP GUIDE** Save You Time and Trouble.....

There's a Tuthill positive displacement internal-gear rotary pump to meet your needs in lubrication, hydraulic, coolant, and liquid transfer service.

To help you select the right pump for your replacements, Tuthill offers this handy, letterhead-size reference chart. It shows the Tuthill pumps available for each type of service, complete with capacities, pressures, speeds, packing, mounting and exclusive performance features. It makes the job of picking the right pump easier than ever before. It saves you time, work and trouble.



Write for your Tuthill Pump Guide today!

TUTHILL PUMP COMPANY

939 East 95th Street, Chicago 19, Illinois

Waldes Truarc Internal Grooving Tool

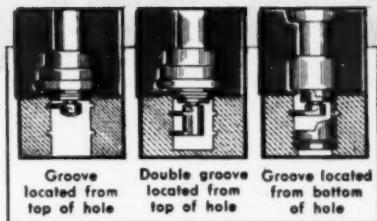
for precision cutting of internal grooves
in bores and housings

FAST! ECONOMICAL! NEEDS NO SKILLED LABOR!



Internal groove-cutting becomes the simplest of operations with Waldes Truarc Internal Grooving Tool. Easy to adjust—easy to operate...readily adaptable to individual requirements.

Designed for use in any hand drill or automatic drill press and screw machine... assures a concentric recess without injury to metal. Operates by fingertip pressure—especially suitable for unskilled operators.



The Waldes Truarc Grooving Tool when used in an electric or pneumatic hand drill, can be taken to the job eliminating disassembly and excessive handling...resulting in all-around savings in time and costs!

Write now for descriptive brochure giving mechanical details, cutting sizes...extra features



WALDES

TRUARC

Reg. U.S. Pat. Off.

GROOVING TOOL

WALDES KOHINOOR, INC., 47-16 Austel Place, Long Island City 1, N.Y.

Waldes Truarc Grooving Tool
Manufactured under U. S. Pat. 2,411,426

Waldes Kohinoor, Inc., 47-16 Austel Place
Long Island City 1, New York MATOS

Please send me your descriptive brochure on
Waldes Truarc Internal Grooving Tool.

Name _____

Title _____

Company _____

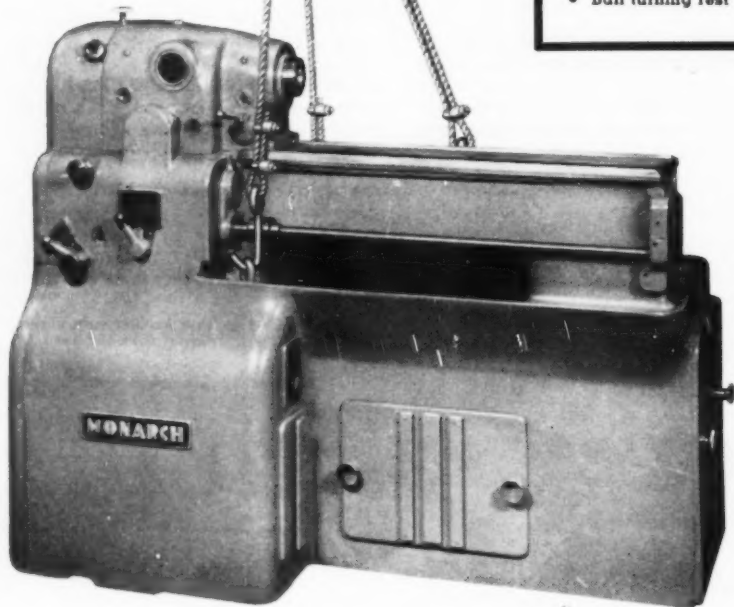
Business Address _____

City _____ Zone _____ State _____

Here's Where

TYPICAL EQUIPMENT

- "Air-Gage Tracer"
- Steady rest
- Follow rest
- Taper turning attachment
- Collet attachments
- Air equipment
- Bar feed attachment
- Collet chucks
- Jaw chucks
- Step chucks
- Stops
- Micro-gaging diameter dial
- Hexagon power feed bed turret
- Hand operated cut-off slide
- Variable feed control
- Ball turning rest



You Come In!

That's right—from here on you can just about write your own ticket! Think of the most exacting assignment for small lathes anywhere along your production lines. Then tell us! We'll deliver a high-speed, sensitive Monarch 10" Model EE—a lathe with an inbuilt productivity matched only by its versatility—and you'll get it with just the equipment and accessories to step up standards for that job.

Note the listing of typical equipment (left). An extraordinarily large choice is available, making it possible for the user to select the ideal combination for the utmost productivity on *his* class of work. The Model EE is equally adaptable for a

wide variety of between center and chucking operations. Note, too, that it can be supplied with the most accurate lathe duplicating method ever devised—the Monarch "Air-Gage Tracer."

These many variations in equipment have been developed solely in response to industry's demands that we make the basic Model EE design available for widening uses. Could anything we say speak better for its design and specifications? Some place—*many* places, perhaps—this outstanding Monarch lathe can improve your production at lower cost. Send the coupon today for full details.....
The Monarch Machine Tool Company, Sidney, Ohio.

FOR A GOOD TURN FASTER...TURN TO MONARCH



THE MONARCH MACHINE TOOL COMPANY, Sidney, Ohio.

Gentlemen: Please send me without obligation your Booklet No. 1003 covering the Monarch Precision Manufacturing Lathe—Model EE.

(It's that new one with 28 pages and a host of those sparkling Monarch illustrations.)

NAME _____

COMPANY _____

TITLE _____

ADDRESS _____

CITY _____

ZONE _____

STATE _____

**INCREASES
PRODUCTION...**

LOWERS COSTS...

**PAYS FOR ITSELF
QUICKLY...**

The ROUSE HAND MILLER is a widely used, inexpensive, high speed, ball bearing, motor driven machine for handling light cuts in brass, aluminum, steel, plastics, and other materials—fast, accurately, and at very low cost. Only \$106.00*.

Fixtures (illustrated) extra.

Motor equipment:— $\frac{1}{4}$ H.P. 110 Volt AC 60 cycle, single phase, swivel motor mount and light — \$29.00*.

*All prices FOB Chicago.



- ★ **MILLS SMALL PARTS MUCH FASTER.**
- ★ **DRASTICALLY CUTS YOUR INVESTMENT IN EQUIPMENT.** Replaces expensive production machinery—or releases it for other jobs.
- ★ **INEXPERIENCED HELP CAN OPERATE IT.** Safe, simple, fool-proof operation.
- ★ **NO MORE COSTLY SET-UP TIME.** \$106.00* price so low that it pays to keep one or more Hand Millers always set-up for special operations.
- ★ **YOU GET A BETTER PRODUCT**—the result of ABSOLUTE ACCURACY.
- ★ **A LOSS BECOMES A PROFIT** when marginal pieces are finished on the Hand Miller instead of on high cost equipment.
- ★ **VERY LOW MAINTENANCE.**
- ★ **USED REGULARLY IN 1163 MANUFACTURING PLANTS** (some of which use as many as 30 machines)—yet on the market a scant few years.
- ★ **UNIQUE—VERSATILE.** Nothing else like it. One or several machines can be the answer to some of your production problems.

**Write today
for further
information.**

H. B. ROUSE & COMPANY

2214 N. WAYNE AVE., CHICAGO 14
50 YEARS OF SERVICE TO INDUSTRY



THE NEW B-35

Weight 10¾ lbs.
Height 7½ inches
Spindle ¾" - 11"
6000-5500-4500-3500 RPM

THE NEW B-12

Weight 10 lbs.
Height 7 inches
Spindle ¾" - 11"
6000-5500-4500-3500 RPM

For cup wheels, sanding pads,
cut-off wheels, wire brushing.

Never Before!!

... SO MUCH POWER PER POUND

MEET the new Rotor Vertical Air Grinders! Never before have you had so much power in vertical air grinders... for such light weight! They're well balanced... easy on the operator. Here are *new* features to speed up your metal removal!

AIR O'TOOL

WRITE TODAY FOR BULLETIN No. 40.

AIR

THE **ROTOR TOOL** CO.

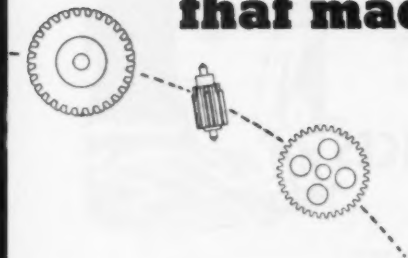
CLEVELAND, OHIO

HIGH
CYCLE

Where *the Finest of
Fine Pitch* **Gears**



Justify the Machine-Skill that made them



Fellows No. 4 Fine-Pitch Gear Shaving Machine means super-accuracy of fine-pitch gears.



The Fellows 3-inch Fine-Pitch Gear Shaper will handle work as small as 1/16" pitch diameter, and as fine as 120 pitch. Magazine loading devices are available.

Gear trains designed to perform super-precision control functions in the stratosphere are no ordinary product. Neither are the methods and machines by which they are turned out—in quantity.

The Fellows 3-inch Gear Shapers and Fellows Shaving Machines, on which the great majority of such gears are made, are standard machines—maintained in fine adjustment by men of industry, men whose production-shop skill is unmatched anywhere else in the world.

That we have the tools, the talent, and the engineering imagination to make maximum use of them is America's fundamental strong defense.

If you have a fine-pitch gear production problem—to normal or extra-close limits—let a Fellows Sales Engineer give you a close-up look at the cost-cutting possibilities of Fellows 3-inch Gear Shaper and No. 4 Fine Pitch Gear Shaving Machine.

Fellows

THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont
Branch Offices: 323 Fisher Bldg., Detroit 2 • 5835 West North Ave., Chicago 39 • 2204 Empire State Bldg., New York 1

*"— and they chopped down
the Old Pine Tree."*

Woodsmen Use Marking Devices!

When a forester indicates a tree is to be cut by the lumberjack he usually points a mark just above the ground and another about breast-high, indicating it is to be cut for lumber purposes. If the tree is diseased he usually marks it with an X or other suitable device, indicating that it is to be cut for destruction or firewood.



CADILLAC MARKING DEVICES are Designed for ALL MARKING PURPOSES

Whatever your requirements, from small Hand Stamps to Pneumatic, Hydraulic or especially created Marking Machinery, CADILLAC stands ready to supply or design and build to meet your needs.



**HEAVY BEVEL
HAND STAMPS**
CADILLAC Heavy Bevel Letters and Figures combine a high degree of hardness with toughness, insuring exceptionally long life.



**HAND STAMP
SYMBOLS**

A system of distinctive symbols for inspection and confidential markings. Write for Symbol Chart.

INTERCHANGEABLE TYPE and TYPE HOLDER SETS

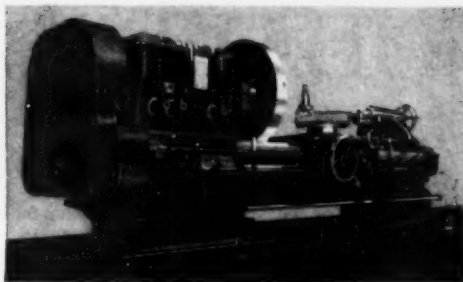
The faces of CADILLAC Steel Letters and Figures combine a high degree of hardness with toughness, insuring especially long life. All CADILLAC Marking Type and the recess in Type Holders are made in standardized dimensions. This means that type will fit interchangeably in hand holders, marking machine holders or punch press holders designed for the size type specified. Due to the precision adhered to in manufacturing, they will when assembled in any holder make impressions in perfect alignment.

CADILLAC STAMP CO.

17321 RYAN ROAD • DETROIT 12, MICH.
3000 IRVING PARK • CHICAGO 18, ILLINOIS

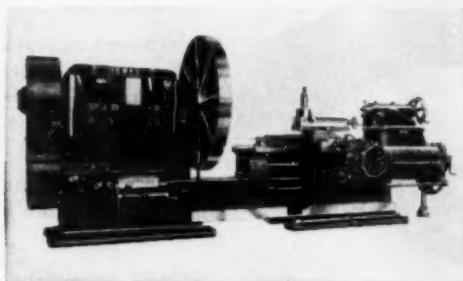
basic

Nebel lathes are made
for basic metal-turning.
Therefore, they're



economical

They require a very
small initial investment,
and they're inexpensive
to operate and maintain.



Nebel lathes

are built in heavy duty engine, removable block gap and extension
bed gap models . . . in swing sizes from 18" to 50".

For complete information
write today for
descriptive bulletins.



ebel

The Nebel Machine Tool Co., Cincinnati 25, Ohio, U.S.A.
The workhorse of the metal-working shop since 1899.




IDENTIFY By Marking!


ROUND — FLAT — IRREGULAR

SHAPES

They're All the Same to Us!



Modern marking machines
are built to roll lettering
on almost any surface—
flat, round, irregular or
what have you!



Flexible tooling can be
provided to handle all in
ONE MACHINE.

Single purpose production
machines with automatic
feeds are cost reducers.

Send us your prints or samples
showing markings required,
and hourly production re-
quired and we will submit
recommendation with quote.

If It's Worth Making—It's Worth Marking.
If It's Worth Marking—Mark It Well.



GEO. T. SCHMIDT, INC.

1802 Belle Plaine Avenue
Chicago 13, Illinois

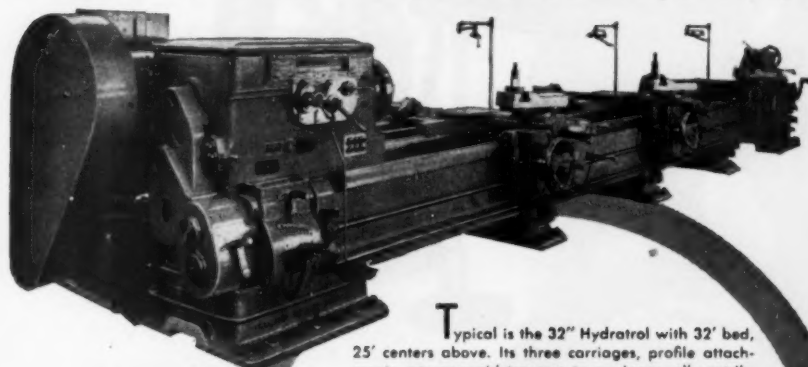




Hydratrol Lathes

Again Helping Uncle Sam to Lower Costs and Increase Production!

LEHMANN'S VERSATILITY OF DESIGN *Machines Gun Tubes Better and Faster*



Typical is the 32" Hydratrol with 32' bed, 25' centers above. Its three carriages, profile attachments, power rapid traverse to carriages, all contribute to doing the rough and finish turning of the O. D. on gun tubes better and faster.

CHECK THESE STANDARD FEATURES

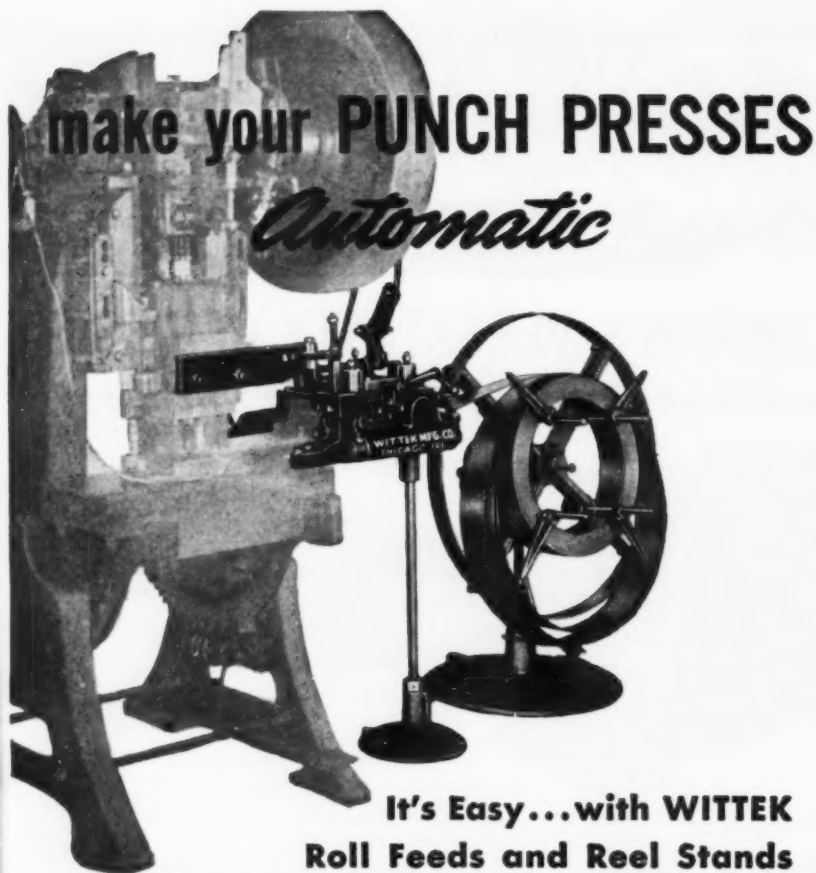
Six Sizes

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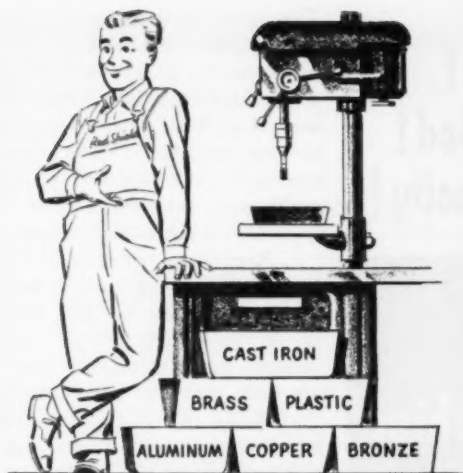
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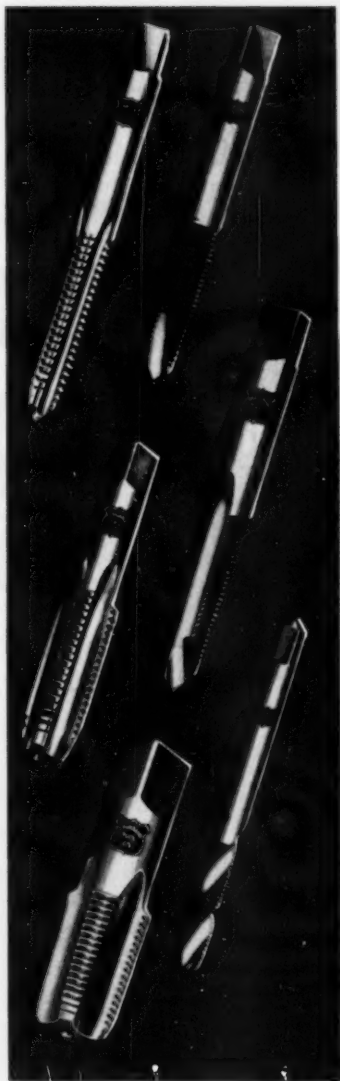


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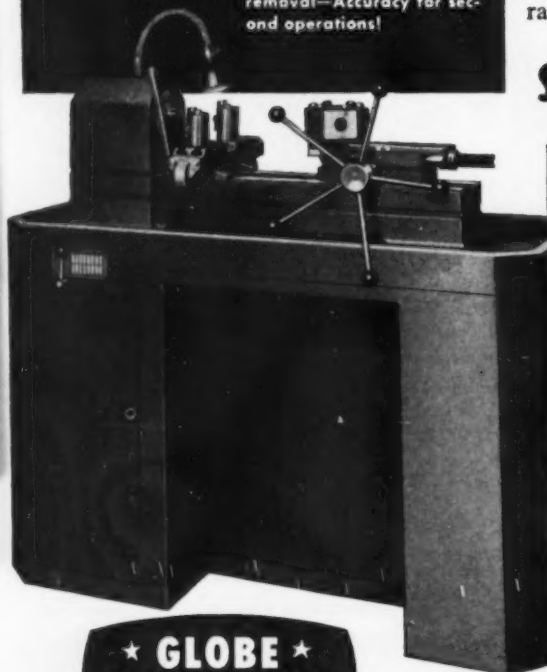


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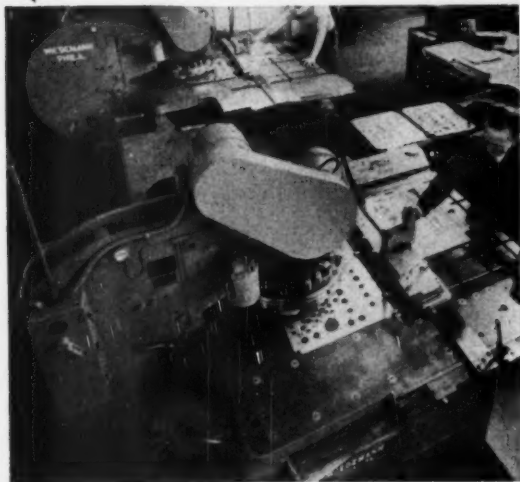
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If you are interested in really reducing piercing costs on short run work, read these facts reported by a Wiedemann RA-41P user:

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Stone and Smith's production record is typical—manufacturers of such diversified products as road machinery, switchgear, electrical products, aircraft, electronic equipment, ships, kitchen equipment, are making similar savings with Wiedemann Turret Punch Presses—short run piercing at long run low cost.

Your production requirements will be given our thorough attention.



With our two Wiedemanns
we pierce major electronic
chassis in about one fifth the
time it required previously
says

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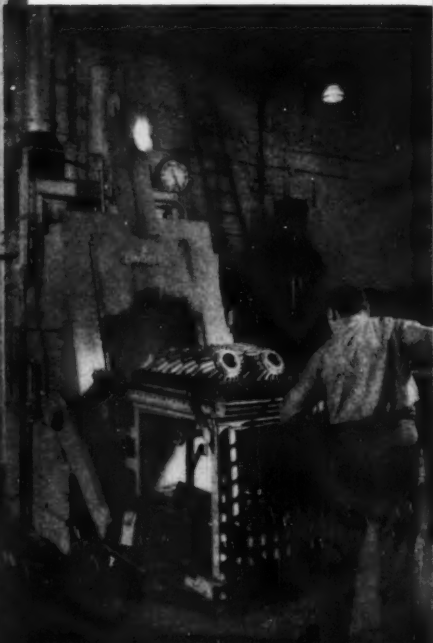


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Well, maybe not that fast . . . but it'll seem that fast if you've ever had to struggle around with the old type heavy radiant tubes. These new gas-fired, vertical tubes weigh only 29 pounds . . . almost as light as a razor blade by comparison.

All you do is turn off the gas, get on top the furnace, lift out the old tube, lower a new one in its place . . . and that's it.

How to install new radiant tube . . . There's nothing to it. Just turn off the gas, lift out the old tube, and lower the new one in its place.



The greatest advance in radiant tube design was made when Lindberg introduced the first gas-fired, vertical radiant tube. It weighed only 29 pounds.

change radiant tubes blades in your razor!

CARBONITRIDING FURNACES

Simple, isn't it? No furnace cooling necessary . . . no extended down time . . . no clumsy plugs to unbolt . . . no squirming around inside the furnace.

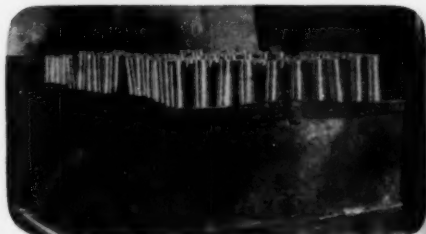
But ease of maintenance is only one of the advantages offered by this amazing Lindberg Carbonitriding Furnace. Check these important construction features:

Quench tank pit unnecessary . . . Your Lindberg Carbonitriding Furnace includes a built-in pitless quench tank . . . thus you avoid costly excavation and piping. But more important, this built-in quench tank minimizes distortion . . . quenching takes place within the furnace structure, by means of a vertically operated elevator. Heated charges are never exposed to the air . . . as would be the case if work had to be transferred from the heating chamber to a separate quench tank. Uniform case depth is assured because each charge automatically remains at heat the same length of time.

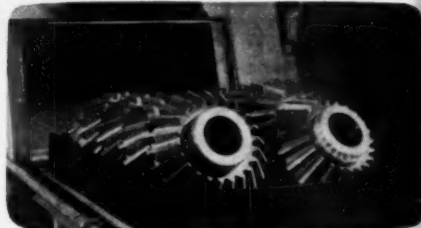
Preheat and purge chamber . . . Prior to entering the furnace heating chamber, work enters area immediately above built-in quench tank. Here, work is preheated . . . this reduces drastic temperature change when work enters heating chamber. Also, the work is completely purged while it is preheating.

Many furnaces in one . . . Furnace atmosphere is provided by Lindberg "Hyon" endothermic atmosphere generator that is easily adjustable to supply different atmospheres not only for carbonitriding, but also for carburizing, carbon restoration, bright hardening or annealing and normalizing. For annealing and normalizing the heated charge cools in the same chamber used for preheating and purging.

For additional information write your nearest Lindberg office . . . or Lindberg Engineering Company, 2442 West Hubbard Street, Chicago 12, Illinois.



CARBONITRIDING . . . Specifications called for .023 to .025" case on these low carbon seamless tubes. The charge weighed 450 lbs., and required 1 3/4 hours.



CARBURIZING . . . 450 lbs. of these bevelled gears, SAE 1020, required three hours total time to obtain a .032" depth.



ANNEALING . . . These SAE 1045 gear blanks were annealed to 174 Brinell. Temperature was 1550° F., time 1 1/2 hours. The charge weighed 350 lbs. Cooling was in atmosphere.

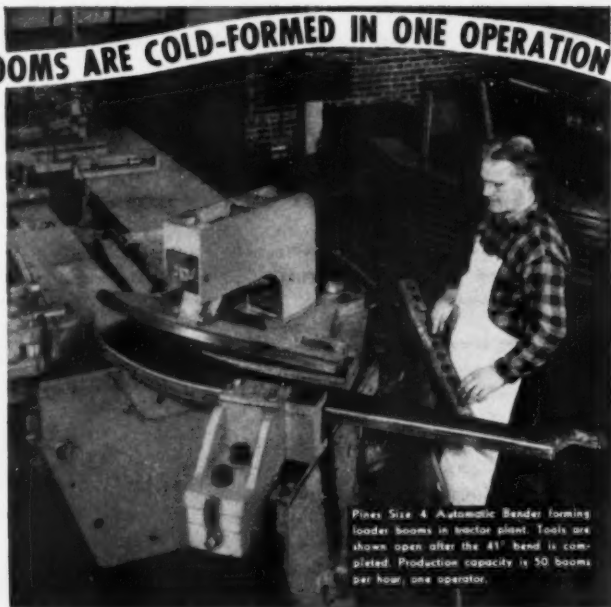
LINDBERG FURNACES

HOW HOLLOW BOOMS ARE COLD-FORMED IN ONE OPERATION



on a

PINES Automatic BENDER



Pines Size 4 Automatic Bender forming loader booms in tractor plant. Tools are shown open after the 41° bend is completed. Production capacity is 50 booms per hour, one operator.

41° Edge Bend in Heavy 12-Gauge Stock Simplifies Production Problem

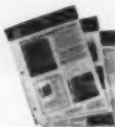
Here's another example of how cold-forming the "Pines-Way" speeds production and lowers costs. The setup illustrated shows tooling on a Size 4 Bender used for edge bending a heavy 12-gauge (.112") hollow tractor loader boom. The pieces are fabricated with a gradual taper, and two straight U-shaped strips are arc-welded together. By adopting the Pines bending method, instead of making curved pieces on a press, a substantial reduction in die cost and scrap losses are affected.



Smooth, Accurate Bends Produced in Tapered Section

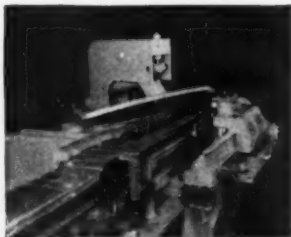
The Bender and special tooling, engineered by Pines, produces a smooth 41° edge bend to a 34" radius. The draw bending principle employed permits holding close tolerances for easy assembly. By using a flexible floating-type mandrel, tapered to fit the inside of the workpiece, and a separate hydraulically-operated hold-down shoe that works in sequence with the clamping die, wrinkles and buckles are eliminated. One man handles the entire bending operation. The hydraulic bending and return cycle is automatic, push-button controlled.

LOADER BOOM FOR FARM TRACTOR
Workpiece is fabricated from two tapered U-shaped pieces, arc-welded together. Both right-hand and left-hand booms are formed on same machine.



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To get a better idea of the cost-cutting advantages and unusual versatility of Pines Benders, write today for free copies of "Pines News" illustrating and describing actual bending and tooling techniques on a wide range of jobs.

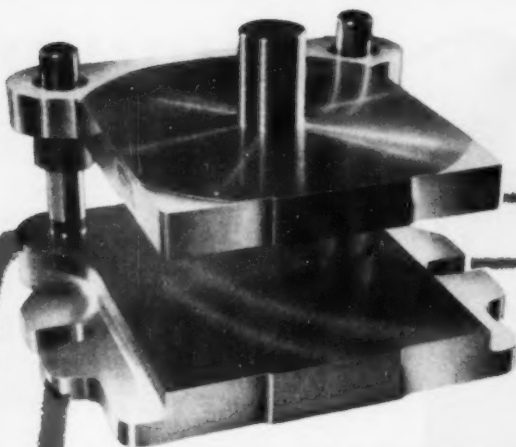


View of floating-type flexible mandrel and tapered sliding pressure die. Automatic air-operated support holds mandrel in proper alignment on forward stroke, retracts for clamping. Some machine with different tooling also cold bends 3" heavy wall pipe for undercarriage loader supports.

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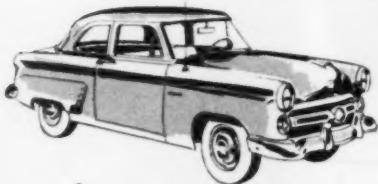
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Featured IN THIS ISSUE

Some thoughts on the use of carbides on chucks.....	147
Practical Dimensioning can save you time and money.....	193
Internal threader reduces threading time 75%.....	180

Washington news letter, by Arnold Kruckman. A monthly column of Washington news written by BLUE BOOK's Washington correspondent. This month's column is packed with news of interest to the metalworking industry. **Page135**

How's Business? Charts and news items complete the picture of business conditions in the metalworking industry. **Page.....141**

Some thoughts on the use of carbides on chucks, by Herman Reichardt. This well-known engineer, who has worked with carbides since their beginning, gives a few pointers on the use of carbides with chucks. Experimentation is important. Each user must feel his own way; very few positive rules can be laid down; however, a few guide posts point the way. **Page147**

The use of fluid power, part 4. This is a continuation of the series on fluid power by H. L. Stewart. This month's installment deals with combination circuits. A number of circuits are shown and their operations discussed. Also included in this article are a number of maintenance tips. **Page156**

Internal threader reduces threading time 75%, James Joseph. This is a discussion of the installation of a Stamets internal threader at Baker Oils, Inc. At one time their internal threading operations called for highly skilled machinists and plenty of time; now the job has been reduced to push-button routine. **Page180**

Oscillating conveyors handle chips and turnings efficiently, by Francis A. Westbrook. The author discusses trough-type conveyors and their uses in industry today. Also described is an installation which was very efficient during the last war and which removed mountains of chips by means of oscillating conveyors. **Page ..188**

When making drawings Practical Di-

mensioning can save you time and money, by Edward C. Helmke. Because too many drawings fail to tell the machinist exactly what is wanted and how best to make the part, the author has developed some interesting observations and techniques on the making of drawings for maximum efficiency. It was discovered that most drawings fail because of: (1) Accumulation of tolerances; (2) tolerances too close limits; (3) improper choice of dimensions; (4) failure to dimension from similar base lines on mating parts. The author points out how these errors can be corrected in his system of drawing. **Page193**

Air cylinders mounted on milling table double operator output. An interesting installation which, through the utilization of compressed air, increases output of a milling machine. The operation is described. **Page201**

Blueprint for manpower mobilization, by Edmund Mottershead. This is the final installment of this series. It is divided into two sections: The first section deals with revamping plant communications, while the second section is concerned with tightening production controls for greater profits. **Page205**

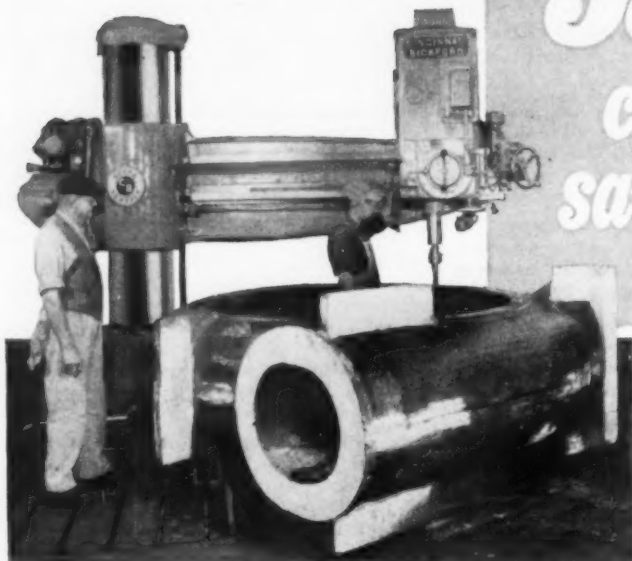
Radioactive cutting tools for rapid tool life testing, by M. Eugene Merchant, Hans Ernst, F. J. Krabacher, **Page236**

Special report on drilling machines. This is the fourth part of the drilling machine report. Included are: an article on proper drilling procedure; descriptions of late model machines; specifications of American-built drilling machines. **Page247**

Also in this issue are the regular BLUE BOOK departments: What's new in metalworking, Shop hints, Available literature, News of the industry, Products index, Index to advertisers

This BICKFORD effected a

35%
*cost
saving!*

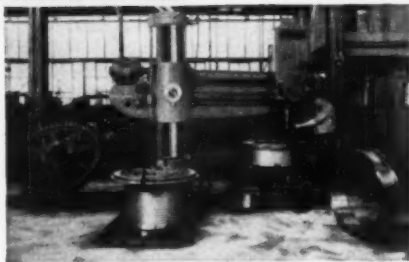


Drilling large centrifugal dredge pump housing. This 7 arm, 19" diameter column Cincinnati Bickford Super Service, equipped with triple base, allows setup of two jobs while the third is in process.

The efficient drilling department at the National Supply Company of California effected a 35% cost reduction in drilling operations with this Cincinnati Bickford Super Service Radial Drill.

Here the many feeds and speeds of the Cincinnati Bickford Super Service Radial Drills—and their rigid construction—combined with their easy operation—handle a variety of heavy duty jobs with outstanding dependability at low costs.

Write for Booklet R-29 on these powerful, accurate Cincinnati Bickford Super Service Radial Drills.



Drilling and tapping a clutch housing. Note the second housing ready for drilling on one of the triple bases of the machine. No time lost in setup.

Photos—Courtesy of National Supply Co., Torrance, Calif.

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AS THE

Editor

SEES IT

Moral responsibility

We're probably woefully antiquated and grubbing among the ethics of a bygone age, at least, we feel like an old fashioned school marm, standing four-square among old fashioned virtues and rapping for order to say a few things about moral responsibility. You know, the pot calling the kettle black. The idea of moral responsibility seems to be in disfavor in the world, there's such a lack of it.


What probably brings the subject to mind is the recent steel strike, a perfect example of irresponsibility on the part of the executive branch of the government and the WSB. The steel strike is not the worst example of moral harlotry in the government which seems to be cluttered with favoritism, graft, corruption and general small and big time chiseling. There's a fine commentary for you: the champions of decency and freedom scraping and grasping for nickles and dimes while making patriotic speeches to cover up the dirty deeds. How too bad that the many thousands of able, honest workers in the government should fall under the same black shadow. But how much worse for the country that this situation prevents top executives and leaders from leaving their jobs to enter government service. And many there are (and have done so in the past) who would gladly leave their present positions to take on the headaches, but not the dishonesty, of work on Potomac's banks.

But the world, as such, is little better. One half of the world openly denounces morality as weak, useless, and rubbish. They thrive on open dishonesty and world-wide gangsterism. Part of the other half has learned to live by handouts and comes with hands outstretched and no ideas of standing on its own two feet. Many nations no longer think of our aid as a help to rehabilitate, but as means of support. The idea of self help is to be discouraged. If one can get it for nothing why work for it? What a pernicious lack of morality is this!

Talking of handouts, there seems to be a lot of it going on in this country. Too large a segment of the public has the idea that the government owes them a living, an idea, by the way, shared by some businesses who expect to be subsidized in one form or another. Probably modern lexicographers have a new name for it, but to our childish mind it amounts to lack of moral fibre to stand up and meet the issues without handouts.

Examples of moral irresponsibilities can be cited for days without end, and because they can be cited ad infinitum it might well be that new codes of morality have been developed in this century. Possibly what was once wrong is now right and what is now right was at one time wrong. That's as may be, we prefer to live with our delusions that honesty and goodness and decency are worth living with and for. If they don't make one rich, they're at least good for the soul.

William F. Schleicher



millions of parts

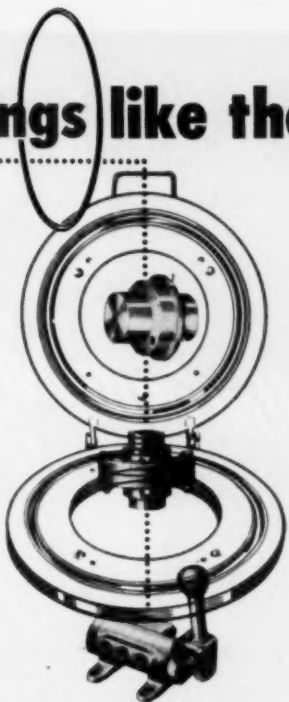
Chatter-free turning, smooth feeds, and rigid construction of this LeBlond 15" Heavy Duty Engine Lathe spell precision plus at Linear Incorporated of Philadelphia. Die orientation is insured by turning and boring mating diameters to .0005" tolerances. Flatness of faces is within .001" and roundness of cavity section is held to .001" of perfect circle. Material: Timken Graphitic MO; tool: high-speed steel.

are married with rings like these

Industry needs sealing rings to "marry" millions of parts against leakage of air, liquid, and gas. Seals, for example, like the rubber "O" rings made by Linear Incorporated of Philadelphia. They're vital to the successful operation of hydraulic mechanisms, air-operated devices, and chemical processing equipment . . . to name just a few applications. And industry says, "Make these sealing rings to precision tolerance for non-leakage. Deliver the millions we need at low cost."

Linear experimented . . . found that "O" rings with the required finish and roundness could be mass-produced easily enough . . . but to turn them out at low cost demanded virtual elimination of hand-finishing operations. The problem called for dies made to tolerances that would deliver cross-sectional roundness conforming to nearly "perfect circle," mating diameters so accurate that perfect die orientation could be achieved.

Then Linear installed their new 16" LeBlond Heavy Duty Engine Lathe. This profit-building lathe is saving expensive toolroom time and delivering cavity finish on Linear's dies as fine as 10 microinches, mating diameters to the required .0005" whisker of tolerance, cross sectional roundness within .001" of perfect circle. Costly die-finishing time at Linear is down . . . flash-removing second operations on "O" rings are at a bone-bare profit-making minimum. It's a case of chatter-free turning, smooth-as-silk feeds, and rigid construction.



LeBlond features like hardened and ground self-compensating steel bed ways, totally enclosed quick-change box, one-piece apron and a host of others will insure Linear a lifetime of this same smooth-turning performance.

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LAST MINUTE WASHINGTON NEWS



by Arnold Kruckman
Washington Correspondent



NPA says the amended M-41 Order enables manufacturers of machine tools and other metal working equipment to "accept, fabricate and ship unrated orders, so long as the rated orders for the production and shipment of the most urgently needed machine tools are NOT delayed beyond required delivery dates."

The industry accepted the Order but is not exactly enthusiastic about it. Henry H. Fowler, NPA Administrator, explained that during the past six months conditions within the machine tool industry have changed so much that nearly 200 companies, mostly small, are unable to schedule their

production to the fullest capacity and retain their skilled labor forces.

Ralph S. Howe, Director of NPA's Metalworking Equipment Division, says two major reasons for the prevailing hardships are the lack of sufficient rated orders and the prohibition against non-rated business. He thinks the amendment will materially assist that part of the industry which has little or no backlogs of rated orders.

New unrated business is expected to keep the little fellows operating at a high level; and it is particularly NPA's hope that the adjustment will keep them operating at a high level so their productive capacities can be available when military demands for tools increase. It is also expected M-41 amended will help those companies which have only about 20% of their capacity in rated orders, and who hitherto have been unable to accept unrated orders which they need to keep going.

NPA stresses that machine tools still are in critically short supply. It lists those tools which may NOT be delivered against unrated orders. There are nine types: boring machines, die sinking machines, drilling machines, gear cutting machines, grinding machines, lathes, milling machines, planers, and shapers. NPA says it made up the list after it had carefully examined backlogs, undelivered tools for so-called "brickbat" programs, and future military requirements.

Mr. Howe promises the list will probably be changed from month to month. He thinks the domestic machine tool industry has been put in a position once again to handle some of the overseas unrated orders, and to recover at least a portion of its foreign market. NPA admits exports have dropped from 10,900 units of total production, in 1948, to 7,400 units, in 1951.

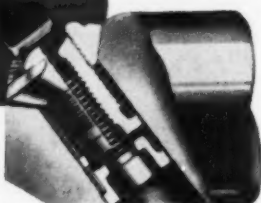
MICROBORE

by DeVlieg

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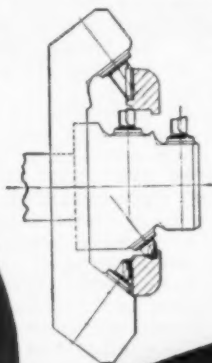
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EQUIPPED WITH
STANDARD
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FACING ■



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During the first four months of 1952, exports dived still more—2,800 units of total output.

It is hoped amended M-41 will reduce hardship appeals from the nearly 300 companies of the U. S. machine tool industry. Howe says over two-thirds of the producers have applied individually for relief this year.

* * *

The report of the Senate Small Business Subcommittee which made the machine tool investigation deserves quotation. It says: "Machine tool shortages were avoidable and were the result of inexcusable shortsightedness and gross mismanagement of the machine tool program at the outset. Shortages have caused incalculable harm. They have prevented many small manufacturers from undertaking defense contracts which they needed badly in order to survive the cutbacks in civilian production.

"The Government machine tool program has failed thus:

"1. By flooding the country with machine tools after World War II, at 20¢ on the dollar, and loading real and pseudo-educational institutions with expensive high-production equipment at 5¢ and less on the dollar. As a result the industry was plunged into the depths of a depression; then it was expected to race into high gear again at Korea

"2. Delay of the Department of Defense from June, 1950 until January, 1952, in producing defense contracts for machine tool builders and other agencies responsible for defense production. The need for such a list should have been obvious about the 28 June 1950.

"3. Cutbacks and changes which have caused considerable uncertainty and dislocation not only in the machine tool industry, but in industry generally."

As a remedy the report recommends:

"1. Special emphasis on process engineering of all future programs for the development of major military weapons. A study of the machine tool needs on an item concurrently with its development is an obvious necessity.

"2. Improved planning on the part of the Department of Defense and decreased shifting of schedules to stabilize production and result in earlier attainment of production goals.

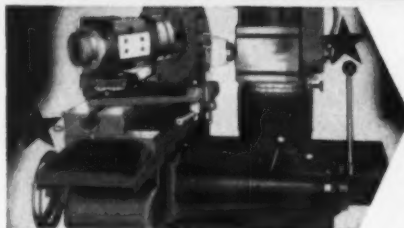
"3. A program to stabilize the machine tool industry, including (a) prohibition against disposal of surplus machine tools at sacrifice prices after the present emergency; (b) stockpiling machine tools to prevent future acute national needs; (c) consideration of changes in tax laws which would encourage modernization of American industry; (d) further study of production acceleration insurance program to establish standby plants fully tooled and equipped in readiness for defense emergencies."

It is of interest that Senator John Sparkman of Alabama, the Democratic Vice Presidential candidate, is Chairman of the Senate Small Business Committee; and that Senator Blair Moody of Michigan is the Chairman of the Subcommittee on Machine Tools.

* * *

Government wants to lease the machine tools in its stockpile—30,000 general and special purpose tools. The machine tools are leased at 1% of the original cost per month. Contract for three years is required. Allowance is made for the condition of the tool in fixing the rent. NPA Central Inventory Branch, which

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absorbed the Armed Services Inventory Branch three months ago, induced the industry to loan it sixty experts, at the rate of one week's service each, to make a spot survey. These experts inspect each tool and file a report. Central Inventory Branch is developing a very complete file. When a manufacturer finishes with a tool it is immediately shipped elsewhere where it can be used. The manufacturer pays the freight, accepts responsibility to maintain its physical condition, and supplies fire and other insurance.

* * *

U. S. Labor Department reports employment in the machine tool industry continued to expand the first four months of 1952. In April production worker employment, 66,200, was more than 70% above the level at the beginning of the Korean hostilities in June, 1950.

It reports new orders for machine tools dropped during recent months, and a backlog of unfilled orders has been substantially reduced. But many special types of machine tools needed in plants producing aircraft, tanks, and other military items, still leave a large number of unfilled orders. Plant expansion is still under way, and employment is expected to continue to rise the rest of 1952. The industry's work week of 47.4 hours in March was the highest of all manufacturing industries.

* * *

RFC and SDPA made much of the fact that they loaned \$25,000 to Harry E. and Robert L. Damits, who recondition, rebuild and sell used machine tools.....To help foreign nations to overcome the "Buy American" law, the White House and the Under Secretary of Defense—himself former head of the Mutual Security Agency—ordered the Armed Services, and other Government Agencies, to give foreign producers an equal opportunity to supply Government needs. The President issued an Executive Order fixing the provision that the "Buy American" law may be waived.....As an immediate result the Ferranti Company, British manufacturers, late in July, received an order for heavy electrical equipment—nine power transformers to be installed in a North Dakota dam project, costing \$1,137,605, which the Britishers supplied at \$200,000 less than Allis-Chalmers, the other bidder, because the British have far lower labor costs. Oerlikon machine tool people, a Swiss concern, also have recently received a big Government order, as well as the English Electric Company, a British concern.....John R. Steelman, Director, Office of Defense Mobilization, recently made General W. B. Wolfe (ret.), President, Oerlikon Tools and Arms Corporation, of Switzerland, a member of the Advisory Committee on Production Equipment for ODM.....Representative Smith (D., Miss.), asked Congress to repeal the law which theoretically required Government agencies to "Buy American." The law is constantly ignored, but Mr. Smith thought it would be more respectable to give the color of authority to the practice of the Government agencies.

* * *

Off-shore procurement—double talk vernacular for procurement in Europe—totaled \$700 million during fiscal 1952, according to the report of the Department of Defense. At the same time Mutual Security Agency reported it had spent \$1,750,000,000 in the same area during the same period.

* * *

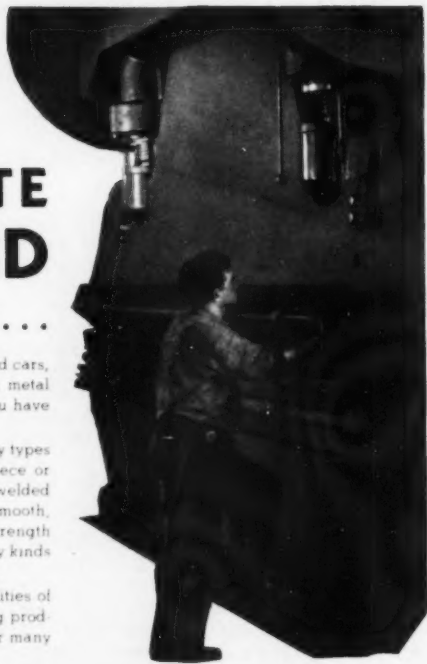
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How's BUSINESS ?

Steel strike post-mortem

The loss in steel ingot production in 1952, from the series of work stoppages, will total nearly 20,000,000 ingot tons. This estimate includes 2,400,000 tons of ingot production lost during the two stoppages which preceded that of June 2, and the tonnage which will be lost in the next 10 days or so while the industry is operating below normal capacity. The loss is more than double the 9,169,500 ingot tons of production lost in the 40-day work stoppage of October-November, 1949.

Inventories of steel generally had been built up to a satisfactory level before the work stoppage shut off the flow from the furnaces and mills. It is estimated that between 50 and 60 percent of the inventories on hand at the beginning of the work stoppage have been used up. As individual plants or entire industries closed down, the rate of "chew up" of inventory declined somewhat, so that the remaining proportion was consumed less rapidly than the stocks used during the first weeks of the stoppage.

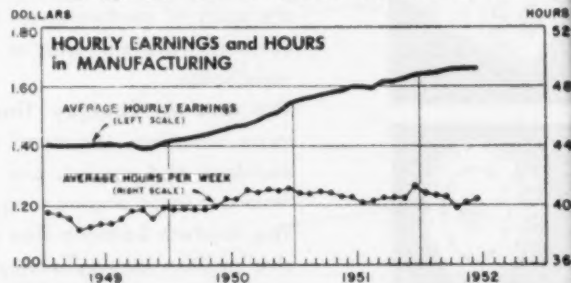
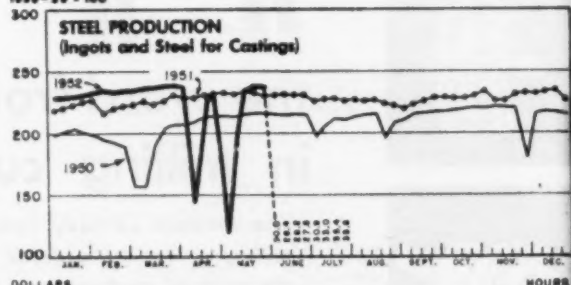
At the time the steel companies and the unions reached an agreement, nearly a million and a half people were unemployed as a result of the steel industry shutdown.

Steel workers	585,000
Iron ore workers	25,000
Automobile Industry workers	400,000

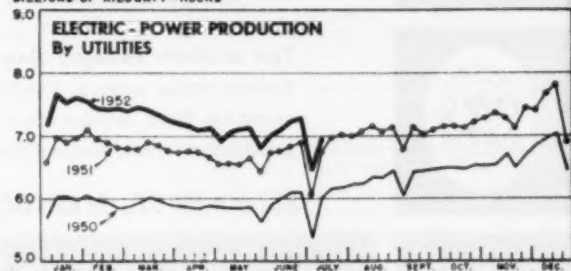
General business indicators

source: U. S. Dept. of Commerce

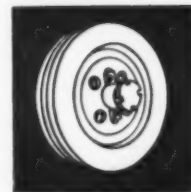
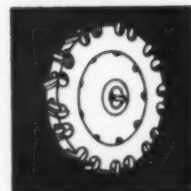
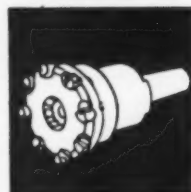
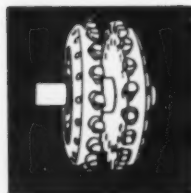
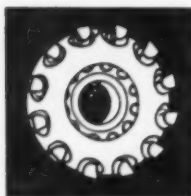
1938-39 = 100



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Railroad workers	100,000
Workers in captive coal industry..	50,000
Other industrial workers	300,000
TOTAL	1,460,000



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Iron ore production

Expansion goal for iron ore production in 1955 has been established by DPA at annual figure of 147 million gross tons. This makes necessary new capacity of 57 million gross tons. This goal does not include the goal for taconite or goals for the Great Lakes and ocean-going ore carriers. Goal for Great Lakes ore carriers has been set at six ships of 20,000 gross tons capacity to be available by July 1, 1954. At least 4 million tons additional ore will be carried annually by these carriers and other transportation in the Great Lakes area. Expansion goal for ocean-going ore carriers, at completion of thirty-eight bulk ore carriers, is estimated at 22 million additional tons of iron ore, and 1,250,000 additional tons of bauxite.

NPA states all controls over the distribution of tool steels are reasonable. Demand for tool steels now is considerably less than the available supply. NPA thinks distribution controls impose a needless burden on manufacturers. Small-volume resellers of industrial steel products, grossing \$100,000 a year, or less, are now permitted to apply their traditional markups to the cost of steel, including that purchased from other warehouses.

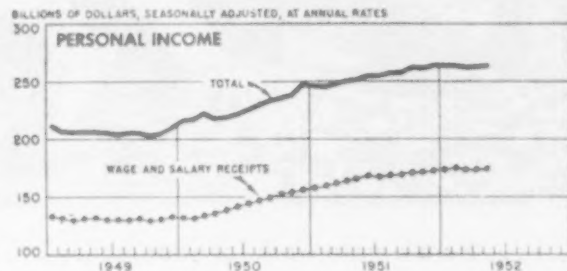
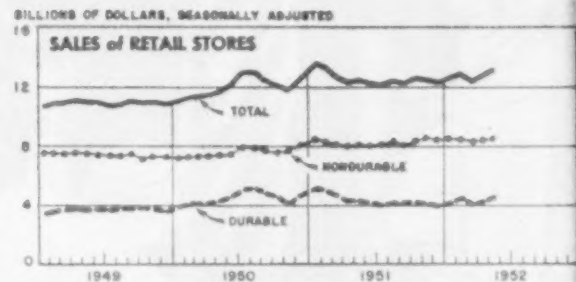
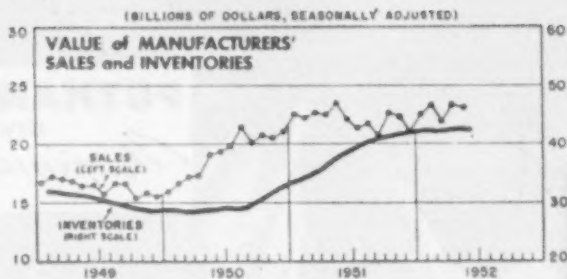
Machine tool orders

Three factors will affect the future of the machine tool industry's sales picture: (1) the defense situation; (2) the political situation; (3) general business cycle. This according to F. S. Blackall, Jr., president of the National Machine Tool Builders Association, speaking at the recent Machine Tool Sales Conference at Cornell University.

Blackall said defense orders would form

General business indicators

source: U. S. Dept. of Commerce



the backbone of machine tool business for the next two years and some years thereafter; however, the need of the defense department will slowly decline and general business will once again become the most important machine tool customer. Blackall believes the next two years will still be good for the machine tool industry. While recent cancellations have troubled builders he believes the trend is toward greater stability even though defense orders are variable at all times.

Indications are that the next machine tool



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show sponsored by the NMTBA will be held in 1955. This date has been tentatively set and a committee has been formed to find a suitable site for the show.

Shortage of tool and die makers

A shortage of 20,000 skilled tool and die makers was disclosed in a current survey by the National Tool and Die Manufacturers Association of 22 tooling centers throughout the country. There are only 45,000 men in the entire country who qualify for work in the tool and die field.

In St. Louis, according to William N. Bachman, president, Bachman Machine Co., there is a critical shortage of 500 to 700 skilled tool and die makers. Major tool and die contracts in St. Louis shops include tooling for B-47 jet airplanes, small arms tooling and aircraft and armament instrumentation.

Herbert C. Murrer, president, Murrer Tool Co., Inc., Cincinnati, reports the labor situation as critical. "Availability of sufficient skilled help is not expected for ten years," he stated.

Albert Goldman, vice-president and general manager, Atlantic Mfg. Co. disclosed an acute shortage of 1,500 skilled tool and die makers and all around machinists in the Philadelphia area.

Dayton, Ohio contract shops are working 10 hour daily shifts. Robert C. Renner, president, The East Dayton Tool & Die Co., estimates their local requirements of skilled tool and die makers at 10% additional. They are employing the bulk of tooling capacity on work for atomic energy, jet engines, range finders, supersonic blade propellers, guns and reciprocating engines.

Reporting from the Chicago region, Herbert Harig, vice-president, Harig Mfg. Corp. points out that 500 to 1,000 men are needed. He indicated wide diversity in activity with no particularly large individual programs underway in local shops. Columbus, Ohio, says J. E. O'Brien, president, The Banner Die, Tool and Stamping Co., is confronted with the lack of 100 skilled tool and die men in completing their aircraft, ordnance, appliance and automotive contracts.

In Massachusetts a critical shortage of hundreds of skilled workers prevails, in the face of important defense work, according to James D. Clarke, president, Eastern Tool Co. of Springfield, Mass. The picture in Detroit as drawn by H. D. Kiefer, general manager, The Interstate Tool Co., is the

same, as contract tool and die shops are compensating with longer work weeks. Contract shops in Rhode Island, meeting large demands for molds for plastic products mostly for civilian consumption, need additional skilled workers, according to Lawrence H. Cook, president, Lawrence H. Cook, Inc.

John Dessel, president, Octo Engineering Assn., Inc., Rochester, N. Y. asserted that local shops, lacking 300 tool and die makers, are active on aircraft, automobile, camera and tank tooling. In Hartford, Conn., according to John D. Dewhurst, president, Arrow Tool Co., Hartford, 750 skilled men are needed to meet the requirements in aircraft, instrument and armory tooling.

In commenting on the situation in Fort Wayne, Ind., Richard G. Nill, manager, Ft. Wayne Tool, Die & Engineering Co. declared that local shops meeting the requirements of the aircraft and electronics industries are being plagued by a critical lack of tool and die makers. Rockford, Ill., surveyed by Carl A. Dahlgren, president, Rockford Die & Tool Works, Inc., also reports a critical shortage.

About 1,500 men are required on contract tool and die shops in the New York City area, reports Jack Kleinoder, secretary-treasurer, John Volkert Metal Stampings, Inc., Queens Village, N. Y.

Philip R. Marsilius, vice-president, The Producto Machine Co., and NPA's former chief of tools, dies, jigs, fixtures and special machinery, stated that the major tooling and die contracts in the environs of Bridgeport, Connecticut, include the aircraft programs for AVCO, Bridgeport Lycoming Division; the Sikorsky Division and Pratt & Whitney Division of United Aircraft. "As a result of the lack of 250 additional technicians in the region, tool and die shops," he declared, "are working between 50 and 60 hours a week, with very substantial backlogs."

"The picture is constant throughout the country," stated Randolph H. Cope, president of NTDMA and vice-president of the Bunell Machine and Tool Co., Cleveland, Ohio, "contract tool and die shops, handicapped by shortage of skilled workers, straining to produce the all important tooling necessary to build our military establishment. In my own area we sorely need 500 men. The country could use another 20,000 skilled tool and die makers."

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Some thoughts on the use of carbides on chucking machines

Tool change


It would be safe to say that over half the battle in getting a carbide job into production is in getting the tool change-time reduced to a bare minimum. The time to consider this is not after the job has been engineered, but while it is being engineered.

On most carbide jobs there are many tools involved. It goes without saying that while one tool is down, the whole machine is down; and when the average tool life is around 500 pieces, and you are supposed to make 800 pieces, you have to change 20-25 tools.

Holder design

It often becomes necessary to change the design of toolholders, not only to facilitate quick change of tools, but also for chip clearance, or simplification of tool grinds.

There is a tendency to crowd the cutting edge of the tool against the top of the holder, so that many times the clamp screws even hit the carbide. This is not necessary. As long as you have support under the bottom, and in back



by Herman Reichardt
Consulting Engineer

of the tool, you can pull your clamp screws well back, and have plenty of chip room.

Keep away from compound angle tools whenever possible, so that regrinds on tools do not have to be held to fancy dimensions, and to keep from moving the holder back and forth. Use tools perpendicular or parallel to the work, except for two or three degree clearance built into the holders for facing tools, etc.

Where tools are hard to reach, you might get magazine clips to hold the tools. These can be pre-set outside of the machine and then set in place against a stop.

Getting the coolant, and plenty of it, right on the carbide is a **must**, and holders should be drilled and equipped to do this job. External piping is not so good because it usually has to be kept too far from the tool.

Surface feet

We cannot recall a time when we ever had to slow a carbide tool down, but do know that we often have to speed it up. Trying to use carbide tools on steel with too little surface feet causes all kinds of trouble. They load up, break, or wear very rapidly. We ended up at well over 400 feet on two installations, that is, 400 feet on the O. D. and about 170 feet on smaller diameters, which we would suggest as the minimum s.f. at which to try to run carbide on steel.

Feeds

When using carbide tools you must have ample feed. Tools which are run at .002" or .003" feed will wear rapidly and work-harden the surface they cut. Still worse, you cannot break the chip, and a carbide job loaded with stringy chips is a mess. Besides being a constant irritation to the operator, such chip conditions block the coolant, and the tool gets alternately heated and quenched, causing the carbide to crack.

Frequently it becomes necessary to make new cams much longer than normally required, just to build up the feeds to a point where we can break the chip. We did this to great advantage on the two installations mentioned above, because we were able to use in and out cams on the cross slide, thus relieving the congestion at the high point. This allowed the chips to fall away, and the coolant to stay on the tools.

A feed of .008" is about the minimum we recommend on any carbide tool, except where the strength of the tool is a factor, such as the trepan tools on one job, where we had to go as low as

.006". However, we never successfully broke the chip with these tools, and they are still the major problems on the job.

Layout

In tooling carbide jobs it is not always necessary to rough and finish. If the tool is ground properly, you will get just as good a finish on a heavy cut as on a light one. So, where only finish is a consideration, and you have .004" or .005" tolerance, use just one tool.

We like to try to stay away from overlapping cuts when one tool is dependent on another. In such an arrangement, if one tool breaks, it will usually take out one or two more. A longer cam and more feed with one tool is much better.

Running carbide tools on steel at high feeds and speeds takes a lot of horsepower. We recommend that each job be checked to be sure that the standard motor is sufficient. We have had to change several motors in the past, to provide necessary horsepower.

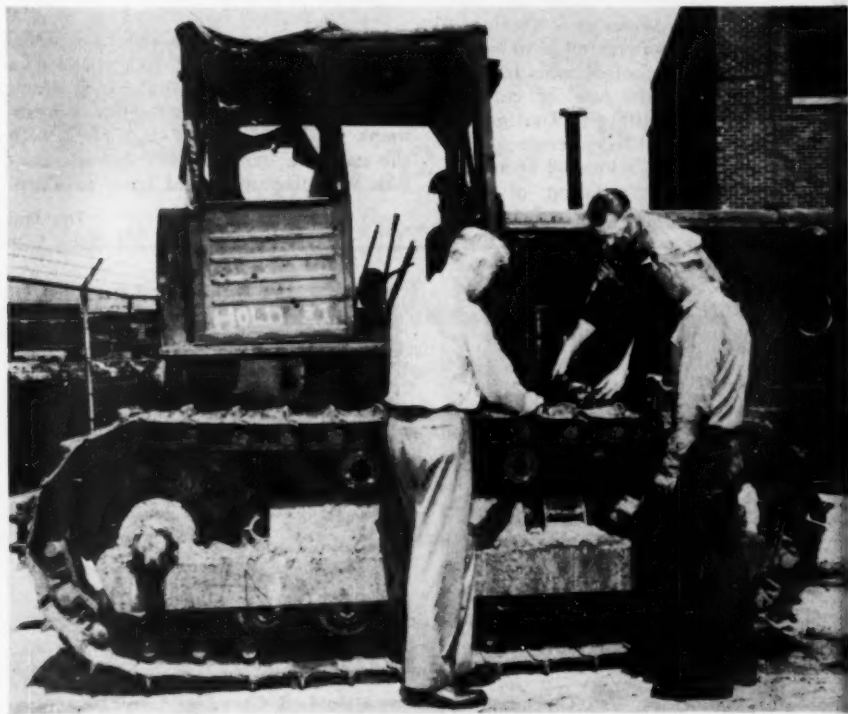


Set up

Wherever possible, try to arrange to have several thousand of the pieces run off in the machine tool builder's plant. We find that even the most carefully engineered carbides job needs to have the kinks removed. The proper grades of

carbide, grinds, chip breakers, feeds and speeds must be studied to give the best results.

To run a carbide job requires a good supply of tools, but we do not recommend making many tools to start with, because very often we have to change the grade or the style. So, to really do a



Engineers at Caterpillar Tractor Co., Peoria 8, Ill., were surprised at the quality of this Russian tractor, captured in Korea. Well built, the Stalinetz 80 shows it to be a copy of a standard Caterpillar D7, probably obtained from lend-lease ten years ago. The Reds redesigned the machine to fit more convenient metric dimensions, no mean engineering feat. Parts are rough on the outside, but careful attention has been given where part finish and close tolerance are needed. Officials suspect the machine is more noisy and would have a shorter life than the American-built one; however, they admitted it was about the same as they would have built, if the same materials were available. On the whole, Caterpillar's research men feel that the D7's illegitimate cousin would give satisfactory service.

job, you first have to do a lot of experimental work to determine the right tools—then order a good supply of them. This takes time, but is the best procedure in the long run.

Costs

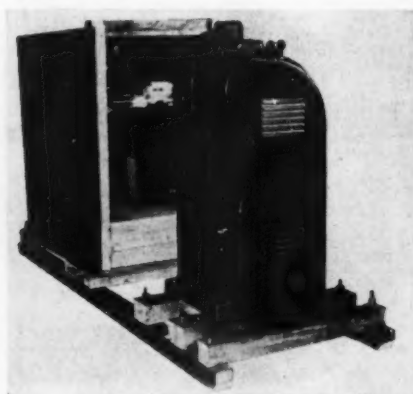
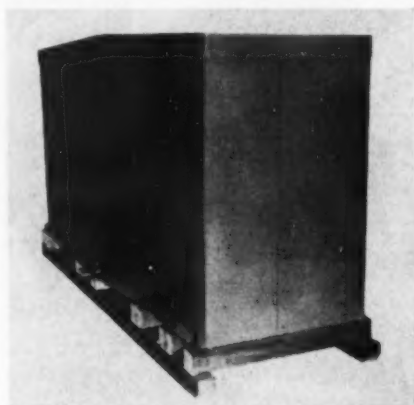
We often get into a plant where the facilities for grinding carbide are bad; even when the equipment is there, the practice is bad. Operators used to working with high speed steel tools have to be broken in to the use of carbide, which is entirely different. Tool grinders who have had little experience with carbide have to be educated from the ground floor. Bad grinding of tools causes all kinds of delay and trouble.

The above factor, along with changing holders to facilitate faster tool change, and working out the best grinds, chip breakers, and coolant problems, take time and money. You can't go half way.

At one plant, four machines and twelve operators had to be broken in on all three shifts. It took an average of two demonstrators four months, and the expense of \$5,600, to do a good job.

But the company has been successful in its application and has realized a tremendous time and cost saving which made the \$5,600 a worthwhile investment. Carbides pay off, but work with the machine tool builders and the carbide manufacturers and have patience!

The End



Cincinnati Metalcrafts, Inc., Cincinnati, Ohio, and **Gaylord Container Corp.,** St. Louis, Mo., have developed a new "package" for the protection and shipment of a 3600 lb. engine lathe. The new packaging technique saves 50 percent to 75 percent in costs and 55 percent in the weight of the package, it is claimed. Formerly the Cincinnati firm prepared the 3600 lb. engine lathe for shipment by covering it with a large paper bag to keep out dirt and then housing it in a nailed wooden crate. The new method is to build a solid fibre container which completely encloses the lathe. A simple vertical wooden frame bridging the center of the lathe is constructed and a stapling hammer used to attach six pieces of .100 solid fibre to the wooden skid and frame. The final step is to staple and tack a lid to the frame. The result is a streamlined, dust resisting "package" peaked in the center to shed showers that might fall during transportation. The principle is adaptable to machine tools of varying sizes. It can be assembled by two men in 30 minutes instead of four hours, and has had excellent reception among railroads and truck lines.



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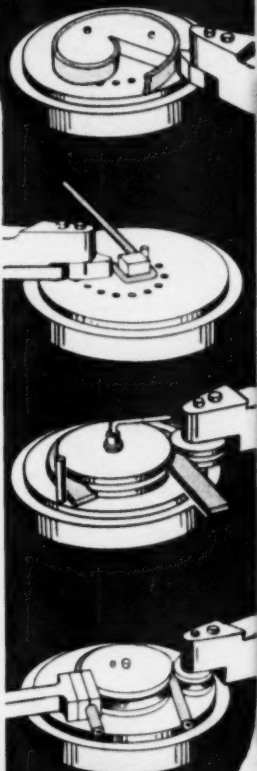
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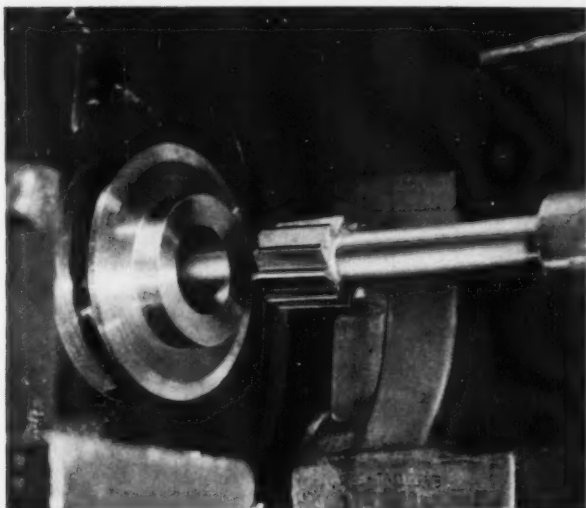
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20-25 micro-inch finish

Reamed finishes which were never considered possible are now obtained on production jobs with Barber-Colman Oil-Feed Reamers. On this job, 1000 pieces were reamed to a surface finish of 20-25 micro-inches before it was necessary to sharpen the reamer. The feed is 1.75" per minute at 280 RPM, requiring 30 seconds to ream the 7/8" length of cut. The material is AISI C 1137 steel. Finishes like this can be obtained in regular production with Barber-Colman Oil Feed Reamers.



oil feed

An outstanding feature of these oil-feed reamers is that the oil feeds through the body of the reamer to flush the chips away from the cutting area. Other types of reamers tend to pack the chips in front of the reamer, increasing the chance for "pick up" which often ruins the finish and shortens the life of the tool. As the oil hits the end of the hole, it is forced back between the flutes, carrying the chips with it. Another aid to extending tool life is that the oil reaches the cutting area on jobs which could not otherwise effectively employ

D E S I G N E R S O F S T A N D A R D A N D S P E C I A L

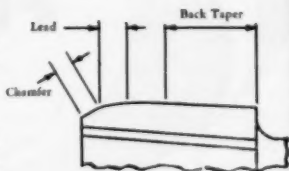
Irregularly-spaced flutes

Irregular spacing is a standard feature of all Barber-Colman Oil-Feed Reamers. This type of spacing provides a smooth cutting action and fine finish and prevents the reamer from forming "welts". Thus, the design of the spacing in conjunction with the oil-feed feature allows these reamers to produce surface finishes which formerly required a secondary finishing operation. To aid in checking the reamer diameter, the flutes are spaced diametrically opposite each other so that they can be inspected with a micrometer.



cam-controlled sharpening

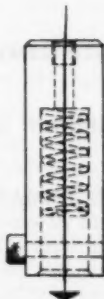
The profile form on the reamer flutes is important in obtaining the best finish and tool life. Following a 30° chamfer, the lead is blended into a radius and followed by a straight portion which irons out the feed marks. This combination produces exceptionally fine finishes. Also, through the use of the Barber-Colman system of sharpening, a theoretically sharp cutting edge is produced rather than a cylindrical land. The Barber-Colman system is cam-controlled so that each reamer is sharpened with exactly the same profile. These are features which are available in no other type of reamer.



self-centering floats

These spring-type floats hold the reamer firmly, eliminating any sagging. Its simple design, consisting of only the holder, drive pin and spring, makes it easy to operate and maintain. An opening through the center of the float allows the oil to reach the reamer. Only two floats are required to cover the complete range of sizes, although a float of extra length is available for the larger sizes. These reamers are available for diameters of .344" through 1.380".

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How you can use

FLUID POWER

Part 4

Combination fluid power circuits

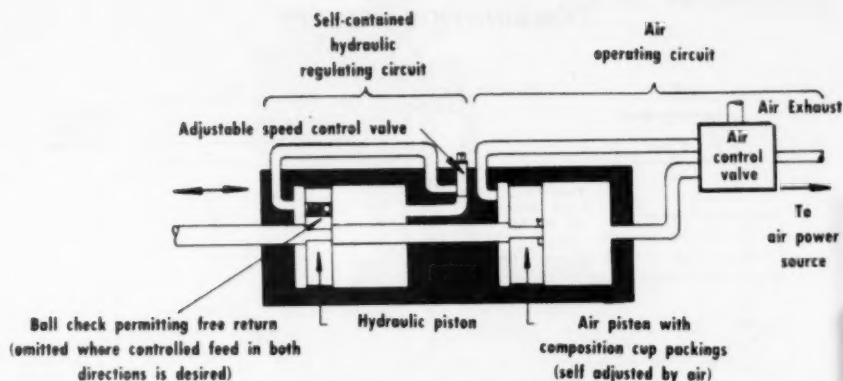
by H. L. Stewart, Logansport Machine Co., Logansport, Indiana

WITH THE DEMAND for faster cycling of fluid power circuits, the use of both air and hydraulic mediums in the same circuit has proved very beneficial in many applications. The quick action of air and the smooth, powerful action of hydraulics team well together in solving many of the high speed production problems that are facing us today in shell plants, rolling mills, and other high production set-ups. The use of the combination of air and hydraulics also will reduce space requirement, original cost of equipment, and operating cost. These points can best be pointed out in the following group of circuits.

Circuit 1A and 1B

Air Circuit with Combination Air and Hydraulic Cylinder

When using a combination air and hydraulic cylinder, a four way air control valve and a filter, lubricator and regulator unit, a circuit can be set up in which the cylinder will produce feeds comparable to those obtained with a complete hydraulic system. The question often arises as to the construction of this combination cylinder. Actually, it is two separate cylinders, a double acting air cylinder in the rear section, and a hydraulic cylinder in the front section. The two cylinders are



Sketch 1A

coupled together with one common piston rod. The hydraulic cylinder is a closed hydraulic circuit which creates no power but controls the feed of the air cylinder. The feed is regulated by a flow control needle which may be adjusted for very fine feeds. The cylinders are so constructed that it is possible to obtain three different actions; feed control on the outstroke with rapid return; rapid outstroke with feed on instroke; and feed in both directions. These different actions are made possible by the design of the hydraulic piston.

Various combinations of feeds may be obtained by the addition of cam-operated flow control valves. For example, in a tool feed it is usually desirable to bring the tool up to the work at a fast approach, then feed slowly during the cutting period, then after the cut is finished, return rapidly to the starting position. This is accomplished by placing a cam-operated flow control valve in the closed hydraulic circuit and contacting it when the slow feed is required. Skip feeds may be accomplished in the same manner.

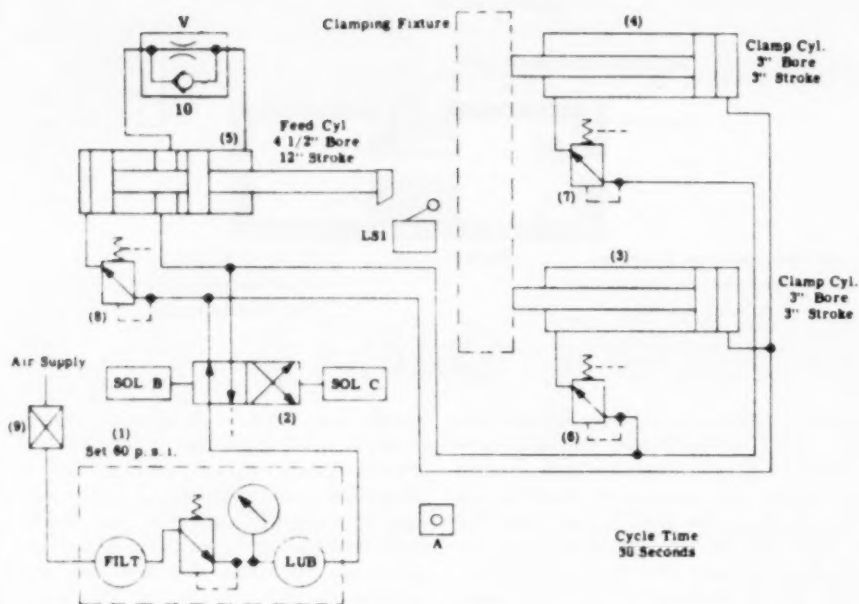
The original cost of this circuit is

much less than a hydraulic system since it eliminates the expensive hydraulic power device. This circuit is especially adaptable to drilling machines, swaging machines, tool feeds, heat treating equipment and other applications requiring fine feed but not a great amount of pressure. The pressure obtained is limited by the bore of the cylinder and the air line pressure.

Often the question arises as to why the air cylinder is always in the back section. The reason for this is that in order to have a satisfactory closed hydraulic system, the displacement must be the same on each side of the piston. By having the hydraulic section at the front of the cylinder, this is easily accomplished by the rod on both sides of the piston.

To obtain satisfactory results from this combination cylinder, the closed hydraulic system must be completely full of oil. Some install these cylinders and complain that they get a "jerky" or uneven feed. This is because they do not remove all of the air from their closed hydraulic system. As soon as all of the air is bled off, the action

COMBINATION CIRCUIT



Sketch 1B

smooths out immediately. Automatic oil fillers are sometimes added to the closed hydraulic circuit to make up for any leakage that might occur through the rod packings.

Circuit No. 2

Synchronizing Piston Motion by Air-Hydraulic Cylinder

By the use of a very simple air circuit and two combination air-hydraulic cylinders, synchronization of pistons of two cylinders can easily be accomplished. This problem has been an age-old headache among designers of equipment who must use two cylinders to move large press platens, tables, slides and other large sections without causing

a binding action from one cylinder moving ahead of the other. In trying to accomplish this with air alone, it would be practically impossible since air is very erratic, and in trying to do it with straight hydraulics many problems arise which are difficult to cope with. Perfect hydraulic synchronization can be approached by the use of metering valves, tying two hydraulic motors together for proportioning, and by using double-end cylinders with cross feeding. Leakage, however, is one of the big problems in these circuits.

The very inexpensive setup as shown in circuit No. 2 is ideal as long as the pressure required to move the section is not greater than the pressure that can be exerted by the air cylinders.

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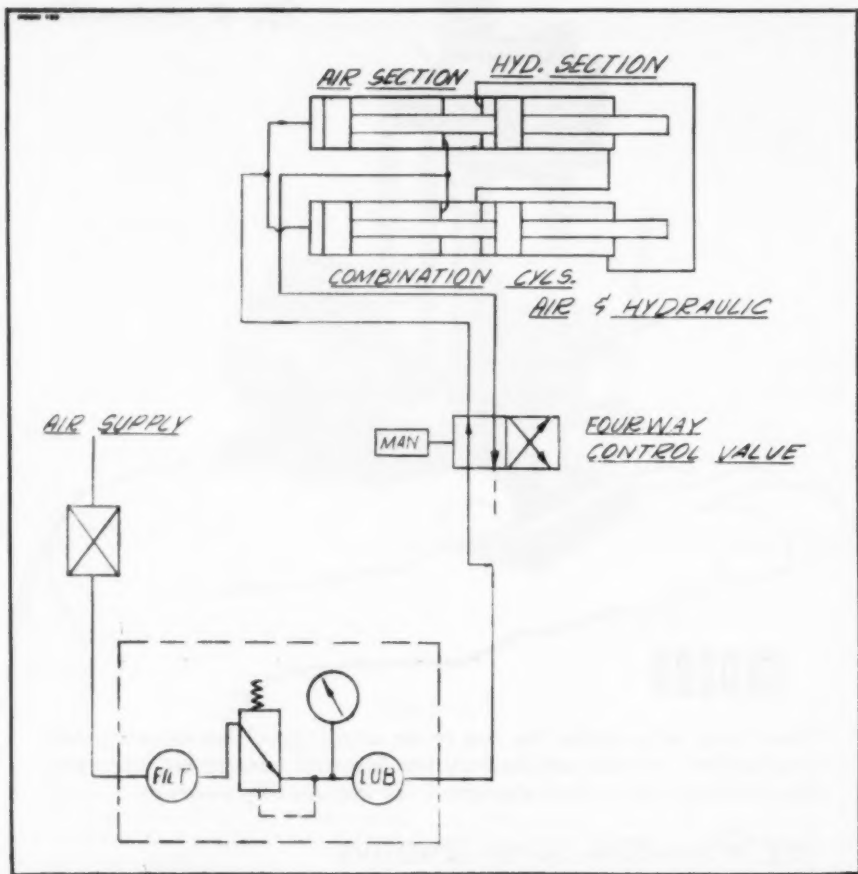
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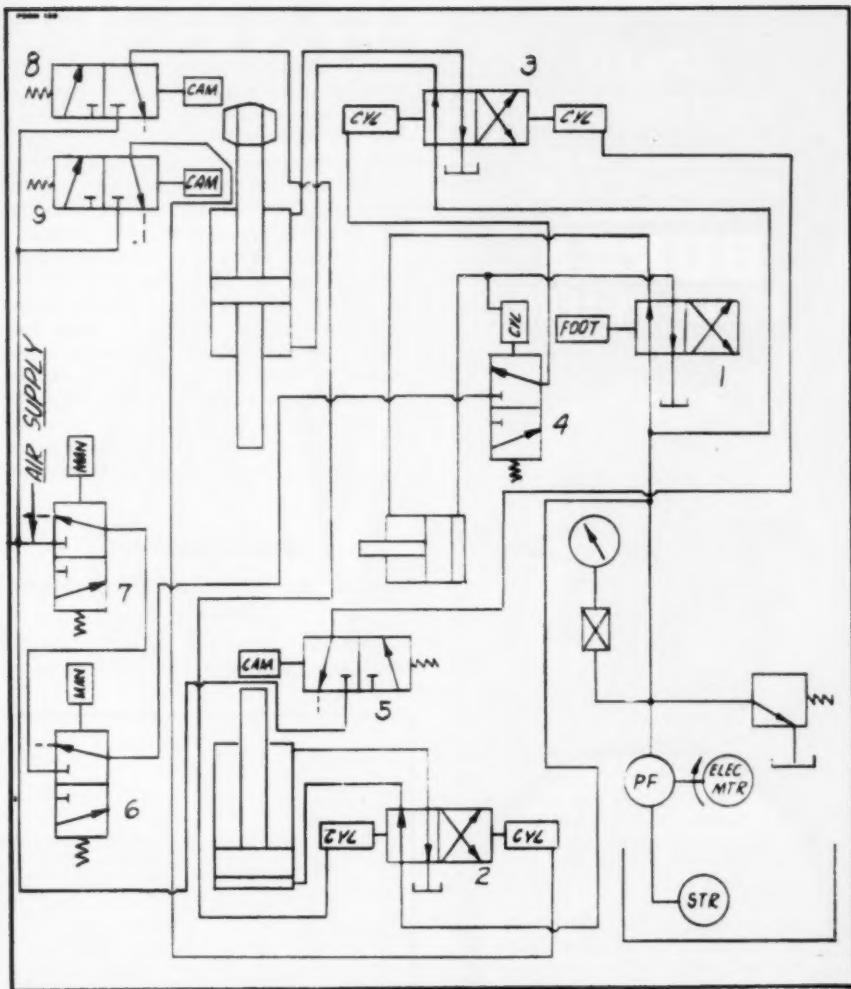
Circuit sketch No. 2

Circuit No. 3

Air Controls in Hydraulic System

Pilot air control valves for operating the four-way master hydraulic control valves in complex hydraulic circuits prove valuable. Actually, the four-way hydraulic control valve is nothing more than a four-way hydraulic valve whose piston is actuated by two small single-acting air cylinders. The big advantage of the air pilot controls is that much

snappier action is obtained in shifting the piston of the large master control valve. It eliminates any lag in the system. Another advantage that must be considered is the cost. By using air pilot valves instead of hydraulic pilot valves in a complex circuit, a considerable amount of money can be saved. Air pilot valves sell for less than ten dollars each, whereas hydraulic pilot valves will be in the neighborhood



Circuit sketch No. 3

of thirty dollars each. The price of piping up the air usually is less expensive than the hydraulic piping, inasmuch as it is necessary to provide exhaust lines for the hydraulic pilot valves, whereas the exhaust from the air is usually allowed to escape to at-

mosphere. Hydraulic pilot valves should be operated at a reduced pressure which causes added expense by inserting a reducing valve off of the main pressure line.

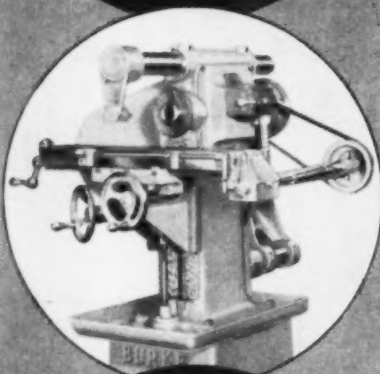
Another important advantage is the ease in which the air pilot valves can

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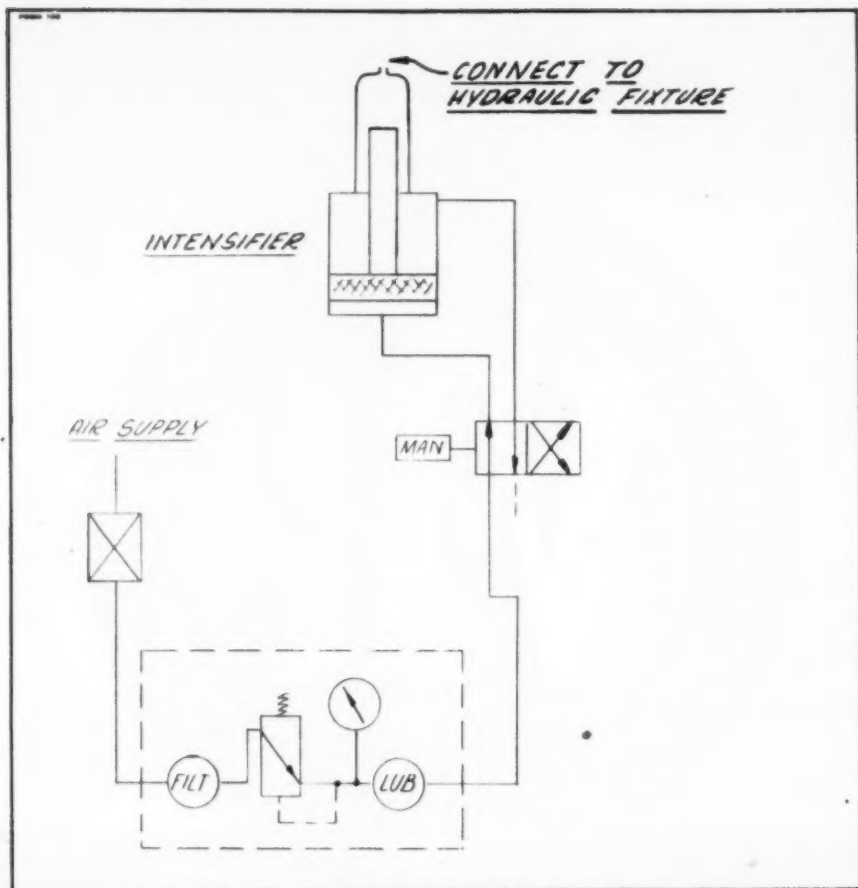
be used as safety interlocks. Note in circuit No. 3 that the operator must depress the foot valve, and the clamp cylinder must close on the workpiece before the remainder of the circuit operates. If he should place the workpiece in the clamping fixture and forget to trip the foot valve but try to operate valves six and seven, nothing will happen, because the air pressure is blocked at valve four. Also, note that both of the operator's hands must be on valves six and seven before press ram will descend after valve four has been operated. This eliminates any chance of operator getting his hands between the press ram and workpiece as the ram is descending at a rapid rate. Safety features of the above type are nearly a must on high production machines.

Circuit No. 4

Use of Air to Intensify Hydraulic Pressure

Hydraulic power can be easily intensified by equipment consisting of a





Circuit sketch No. 4

filter, lubricator and reducing valve unit, a master air control valve and the intensifier unit. This unit is designed with a double-acting air cylinder on one end and an intensifier chamber on the other. The piston rod of the air cylinder acts as the intensifier ram. The amount of hydraulic fluid intensified and pressure to which it is intensified depends upon the bore, stroke and operating pressure of the air cylinder. For

instance, a ten inch bore air cylinder operating at 100 p.s.i. and having a 2-3/4 inch diameter piston rod will produce an intensified hydraulic pressure of 1.340 (not including friction loss). The amount of intensified pressure for a ten inch stroke will be 59.4 cu. in. Intensified pressure can be easily altered by changing the air line pressure.

Many applications are found for this type of circuit, especially in testing fix-

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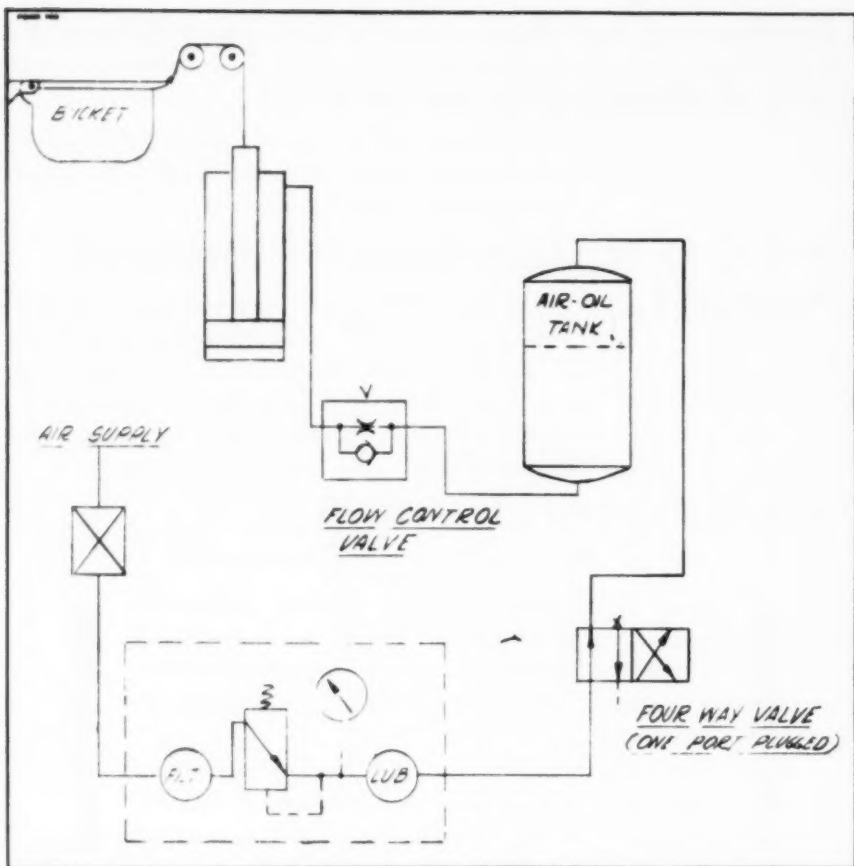
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Circuit sketch No. 5


tures where only small amounts of intensified fluid are required.

Circuit No. 5

Air-Hydraulic Combination for Snubbing Action


A circuit employing a hydraulic cylinder, hydraulic speed control valve, an air oil tank with pressure gauge, and a four-way air valve can be used to advantage as a snubber and metering device for heavy loads.

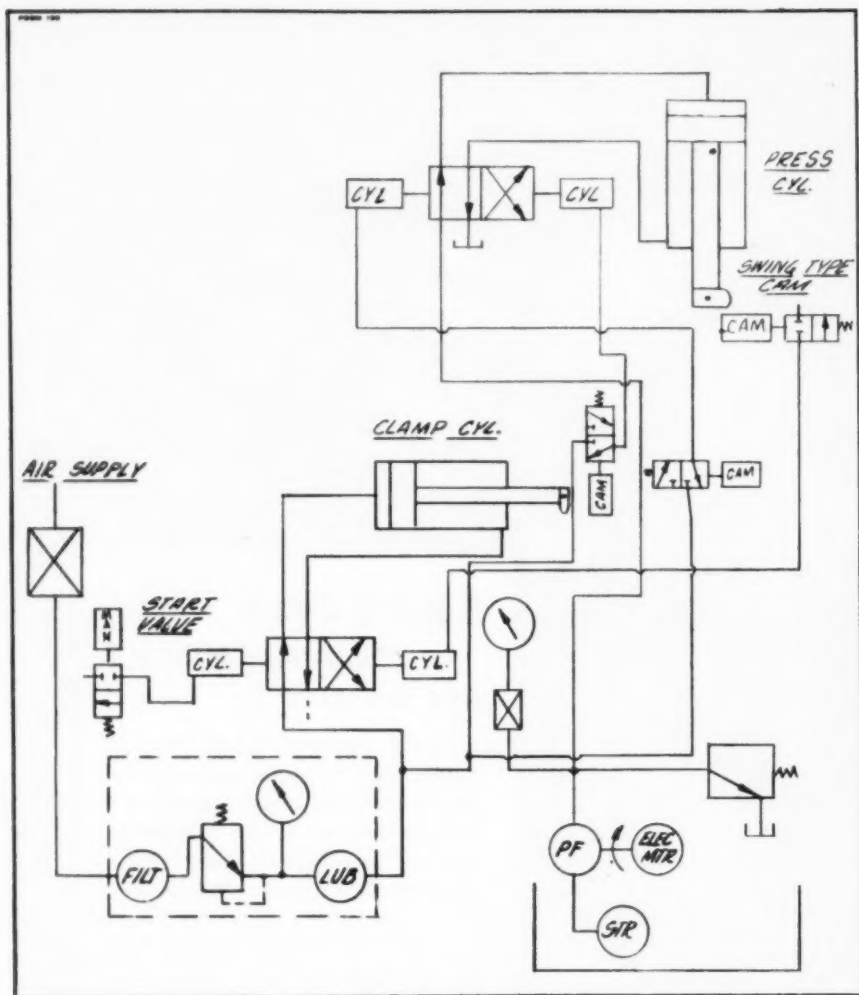
In circuit No. 5, bucket is pulled rapidly to the closed position by the air forcing the hydraulic fluid into the top side of the hydraulic cylinder. The cylinder piston moves to the blind end of the cylinder. After bucket is loaded, master air valve is shifted, allowing air to exhaust from the air-oil tank, and piston starts to move out at speed set by flow control valve; bucket then slowly lowers, pouring out its contents. Very slow pouring can be accomplished



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Circuit sketch No. 6

by the setting on flow control valve.

Circuit No. 6

Two Mediums Give Desired Action in Semi-Automatic Circuit

By using air for actuating the clamping fixture and hydraulics for operating the feeding mechanism, pressures,

speeds and feeds are readily accomplished. The action of the air quickly clamps the work while the feeding cylinder advances the tool into the work at a smooth, even rate of feed and with ample power to perform the necessary operations. In using air pilot controls, the semi-automatic cycle is quickly



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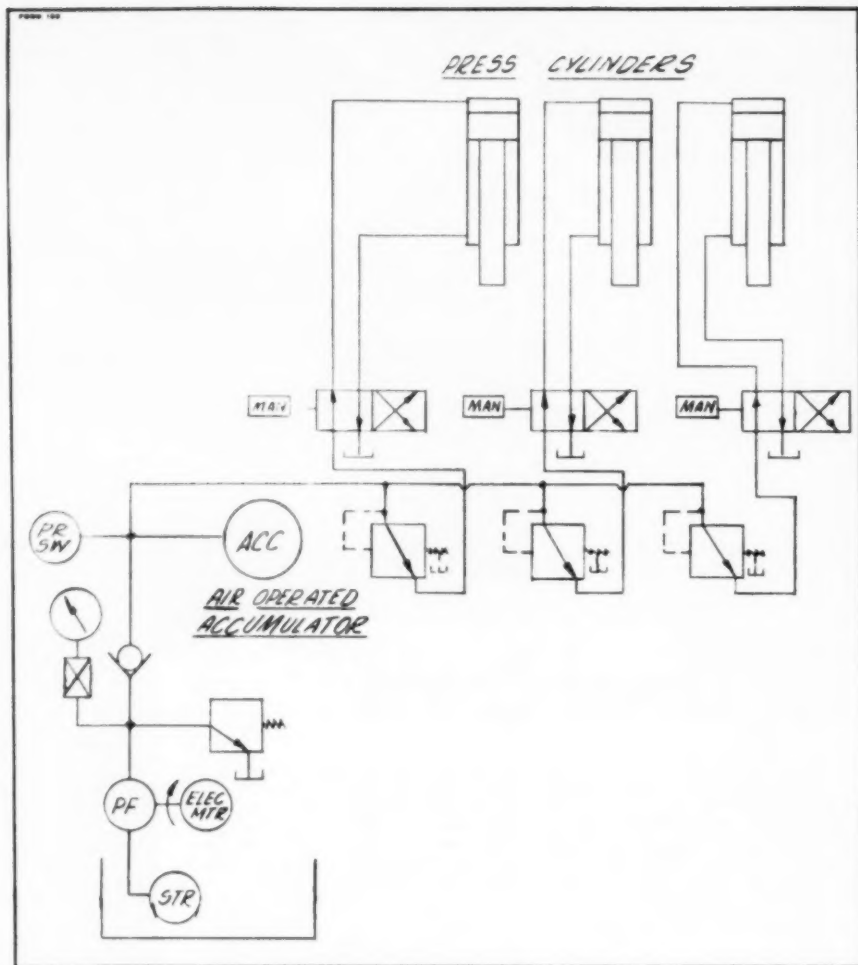
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Circuit sketch No. 7

accomplished. The operator merely shifts the handle of the start valve and the rest of the cycle takes care of itself. By adding another three-way valve to the circuit, automatic chip removal may be included.

Circuit No. 7
Air-Hydraulic Accumulator Valuable
for Long Holding Periods

The addition of a high pressure air operated hydraulic accumulator to the circuit will often pay for itself many times by the saving in electric current. It will also reduce oil heat on circuits in which there must be long holding periods under high pressure. Another thing that proves their worth is that there is always a volume of oil present at high



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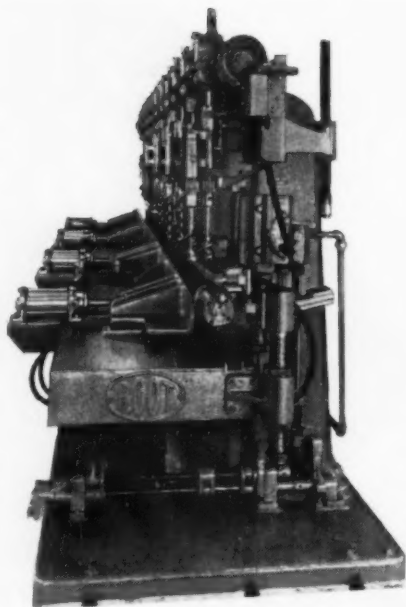
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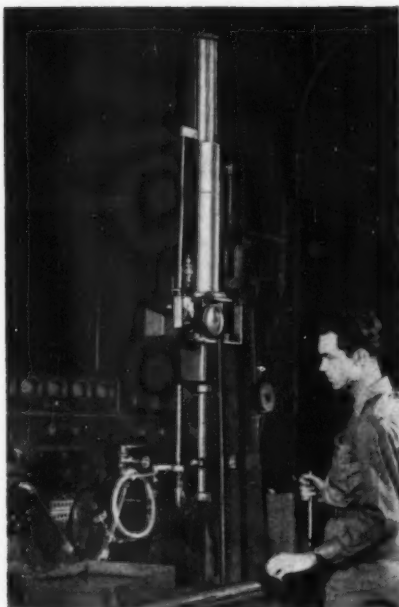


Special machine in which air is used for clamping and hydraulic power for feeding (Courtesy B. M. Root Company.)

pressure for emergency use.

Circuit No. 7 shows the application of the air-hydraulic accumulator being used in a press circuit where it is necessary to hold high pressure on the work pieces for long periods of time. By using the accumulator, the motor of the power unit only runs when the pressure in the accumulator drops below a safe operating pressure. This saves much on the entire system.

Designers are now recognizing the many advantages afforded by the use of the two mediums in combination and it is likely that a great many circuits in the future will make use of these advantages.



Application of airhydraulic cylinder on Tocco heat treating equipment. Smooth even feeds are accomplished without a hydraulic power device.

Maintenance and service tips

Drain Connections— Hydraulic Components

When manufacturers of hydraulic equipment attach big tags marked "connect to drain" on pipe plugs in their hydraulic components, it is only reasonable to assume that these instructions will be followed. Many times these instructions are not followed; the result is that much money is wasted on service trips. A customer will call and complain that the circuit which was designed for him won't function and that he wants a service man immediately because his entire production line is tied up. After a consultation between the circuit designer and the service man, in which neither can visualize the



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trouble, the service man goes to the customer's plant. Here he looks at the circuit and sees a tag hanging on the drain plug in one of the valves. He immediately removes the drain plug and connects the drain to the exhaust line and the circuit functions perfectly. A very sad story but it's surprising how often it happens. Many dollars are spent every year for service work of this kind.

Recently, a case came up where a customer called in and advised that he

was experiencing trouble with a cam-operated speed control valve. He stated that it would function properly for a couple of cycles when first starting up the machine, then it wouldn't function at all. After questioning him at length as to how he had his circuit set up and trying to picture the trouble, which is sometimes pretty difficult over a telephone, a last desperate question was, "Do you have the drain line connected?" His reply was, "No, I didn't think

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it was necessary." You can easily guess the rest of the story. It happens time and time again. Drain connections are in hydraulic components for a purpose and are just as important as any other connections. The best way to make one of these components malfunction is to leave the plug in the connection.

Sometimes the question comes up as to the reason for drain connections. There is bound to be some seepage past

a hydraulic piston where there is a metal to metal fit. The seepage builds up until there is a small volume of oil formed and if there is no drain, the spool of the valve cannot penetrate the oil, thus stopping the piston movement such as happened in the case of the cam-operated speed control valve. Many functional valves, such as sequence, reducing, cam-operated speed control, and others have drain connec-

25 years of research

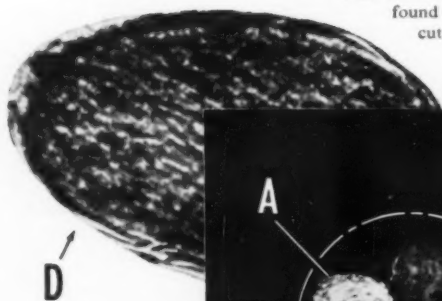
IN CHIP FORMATION LED TO THE NEW

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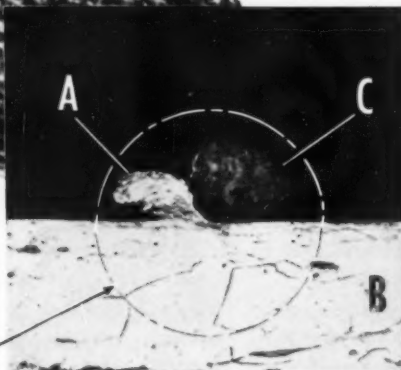
In more than a quarter century of research, it has become increasingly apparent that the grinding process is a true metal cutting process. Cincinnati Milling research has proved that the grinding grits do not abrade or wear away the surface of a workpiece but form chips which agree in classification with the basic chip types found in other metal cutting processes.

The essential factors involved in this vitally important matter of good chip formation are:

1. The tool must be well supported and properly presented to the work.
2. The chip must slide freely up the face of the tool.
3. Heat generated must be kept to a minimum.
4. The heat that is generated must be removed rapidly.

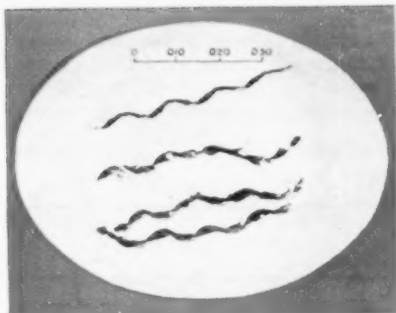


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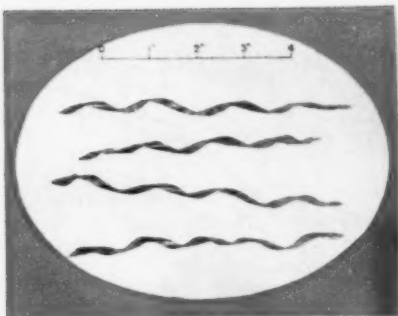


"FROZEN ACTION"

Formation of a tiny steel chip by a grinding grit traveling at 6,000 feet per minute. Minute size of chip (A) and grit fragment (C) is indicated by a cross section of human hair (D) photographed at the same magnification—780 times size. Workpiece (B) is SAE 1112 steel.



Type 2 chips obtained from grinding operation on SAE 1112 steel, selected to indicate the free chip formation possible.



Type 2 chips obtained from helical milling operation on SAE 1112 steel. Note similarity in shape to the grinding chips.

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Type 1 chips obtained from grinding operation on cast iron. Typically discontinuous or segmental.

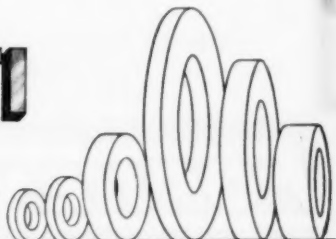


Type 3 chips obtained from slow speed grinding operation on SAE 1112 steel continuous with built-up edge.

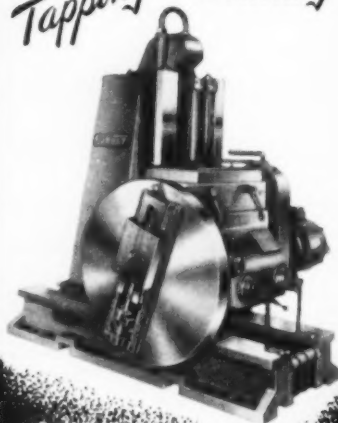
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tions that must be open.

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End of part 4. Part 5 will appear in the October issue.



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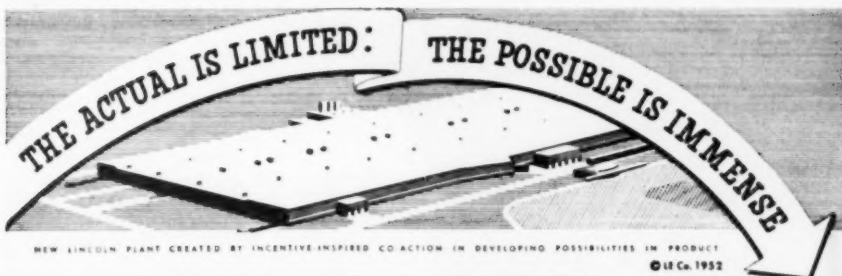
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WELDED STEEL SIMPLIFIES CONSTRUCTION IMPROVES PERFORMANCE, CUTS COST 33%

By **Russell M. Roberts**, Chief Engineer,
Parks Woodworking Machine Company, Cincinnati, Ohio

Changing over our hand saw frame to welded steel design has simplified many production problems while cutting costs by one third.

The original cast construction (Fig. 1) called for machining a complicated casting on which foundry rejections were common. The present welded steel design utilizes simple square tubing, sawed to size, clamped in a plain fixture and butt welded. The efficient use of steel has cut weight by 57% while increasing strength and rigidity.

An added benefit, made possible with welded design, now permits independent leveling of the work table that formerly could be accomplished only through a major adjustment of the frame itself.

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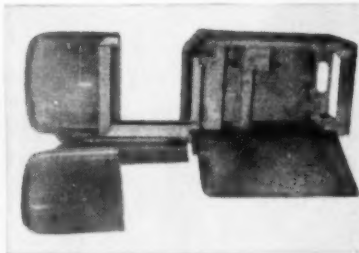


Fig. 4—All Welded Steel Frame for the Parks Woodworking Machine Co., Cincinnati, Ohio. Sides are braked from 12 gauge metal.

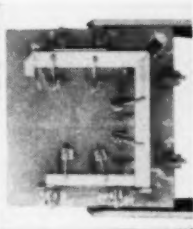


Fig. 3—Simple Jig for welding square tubing. Jig holds clamps, clamps tubing and insuring fast.

PROPER DESIGN IN WELDED STEEL ALWAYS IMPROVES PRODUCT, LOWERS COST



Fig. 1—Original Construction—Machine bracket formerly weighed 56 pounds, was difficult to cast, high cost incurred from excessive rejects.

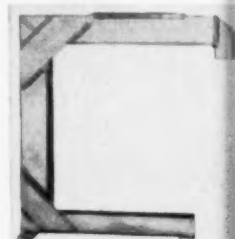


Fig. 2—Welded Steel Design is stronger, more rigid yet weighs only 35 pounds. Weldment cost 33% less than original casting. Eliminates considerable time in machining and assembly.

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Threader Reduces

Time 75%

by James Joseph

BAKER OIL TOOLS, INC., which manufactures a variety of specialized oil tools, all of them subject to high strains and stresses and most of them operating thousands of feet below the earth's surface, has reduced internal threading time on large-diameter casings by 75%.

The operation, once slow and costly, and calling for highly skilled machinists, has been reduced by a specially designed and modified Stamets vertical lathe to a routine push-button job.

Internal threading of small-sized pipe is a pretty old story, and has been successfully done on a variety of horizontal lathes. However, the problem at Baker involved large casing collars which receive female threaded casing pipe on various types of "floating equipment" used in drilling oil wells.

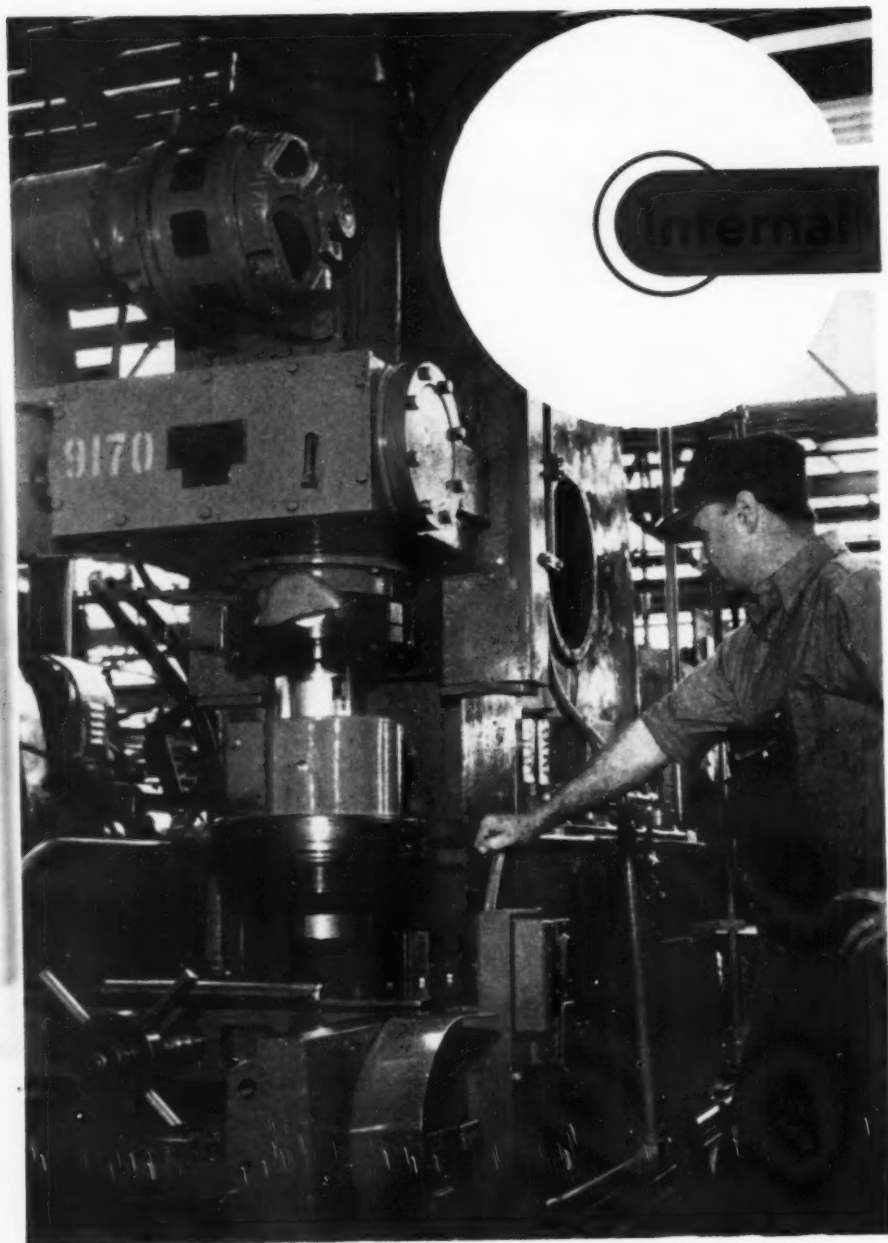
The vertical Stamets can handle casings from 6 $\frac{3}{4}$ inches OD to 13 $\frac{3}{4}$ inches OD, and turns out a finished and threaded casing collar at the rate of from 5 to 8 pieces an hour.

Redesigned and modified to Baker's specifications, and with much of the engineering coming from Baker's own staff, the Stamets features a free-floating chuck, a strong C-frame and special Landis die head equipped with multiple circular chasers which retract when the head is moving up and out of the work. The free-floating chuck enables the casing collar to "float" into alignment on a horizontal plane. After the collar is secured in the three-jawed horizontal chuck, the machine is fully automatic, via "start" push-buttons and various self-tripping devices.

Chasers give a $\frac{3}{8}$ inch or $\frac{3}{4}$ inch taper or a straight thread, as desired. The chasers, 6 to 12 in number, depending upon the diameter of the casing, are fastened to the head by adjustable slides. Adjustment in the final positioning is to micrometer accuracy. Once the set-up has been made, the machine is fully automatic.

Baker's modified Stamets is the only vertical internal threading lathe of its

Left: This Stamets vertical lathe can handle castings from 6 $\frac{3}{4}$ inches OD up to 13 $\frac{3}{4}$ inches. It turns out a finished and threaded casing collar at a rate of from 5 to 8 pieces per hour. Lathe features free-floating chuck, strong C-frame and special Landis die head equipped with multiple circular chasers.



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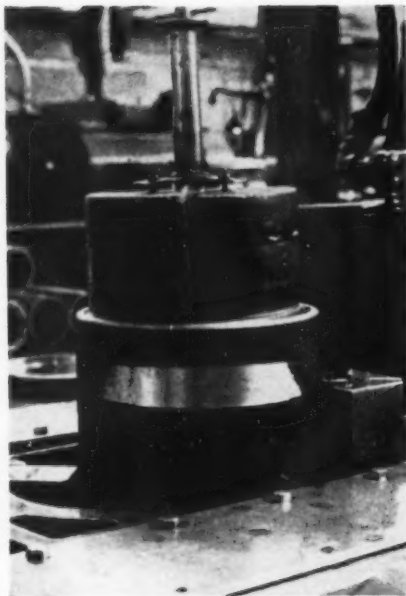
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Shop-made, 3-piece expandable wooden block picks up casings and lowers them into the chuck. As the blocks are raised via the hoist along a tapered metal rod, they expand, fit tightly into the casing and hoist it. Threaded casings are removed in the same fashion by the same wooden block.

size and type on the West Coast; it has piled up an enviable record in production efficiency.

The Stamets has four speeds: 7, 11, 17, and 24 r.p.m. Spindle-speed reduction gears are lever-controlled.

Tom Ragan, plant engineer at Baker, says that the lathe "will tap an internal thread that will pass a gauge inspection in about one-quarter the former time, when the same work was turned out using a single tool on an engine lathe. What's more important from our point-of-view, this speed and efficiency can be achieved with semi-skilled help."

Before discussing some of the production jobs this vertical lathe has been doing, let's see its sequence of operations:

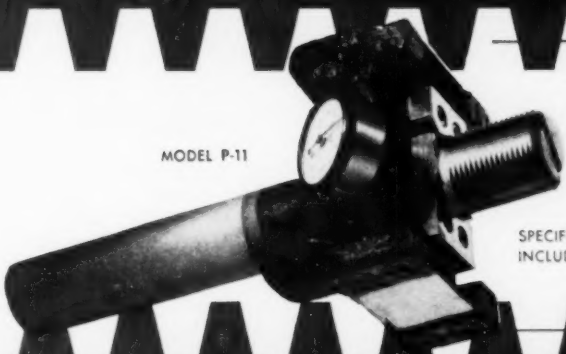
- (1) Taps (chasers) rest in upright position before "start" button is pushed.
- (2) When "start" button is pushed, the chasers fall into the cutting position, i.e., in the down position.
- (3) Next, rapid traverse lowers the head until it is positioned about $\frac{3}{8}$ inch above the work. The rapid traverse then stops.
- (4) The head starts revolving, the r.p.m.'s depending upon the setting. The head begins lowering into the work, feeding by a lead screw in the top of the machine.
- (5) By the time the head has revolved twice, a switch is tripped which begins flow of coolant which floods both tap and work.
- (6) The head with its chasers feeds downward on the lead screw (self-feeding) until it reaches the desired and pre-set thread depth.
- (7) When a trip ring in the body of the tap presses on the top of the casing collar, the chasers collapse (retract), and the head moves up and out of the work to a point about $\frac{3}{8}$ inch above the work. At this point the head stops revolving, the coolant shuts off and the head begins rapid traverse to its original position.

One of the many special features of this lathe is that it can handle casing up to 26 inches in length. This is one reason why it is vertical. Of course, using a tapered thread, it can't cut this entire distance, but when straight tapping, threads can be cut for about 14 inches.

Another advantage in this production set-up is that chips and shavings fall clear, while on horizontal lathes they sometimes clog or must be removed.

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Head with chasers poised just above the work, and just before head begins turning on its downward course.

10 tons (without head), the Stamets is mounted in Baker's new East Los Angeles plant on a special 10 x 12-ft., 40-inch deep concrete base, which contains some 7 cu. yds. of concrete.

Rapid traverse is provided by a 1450 r.p.m., 5 h.p. motor mounted atop the lathe. A Westinghouse gearhead motor, 7½ h.p., and adjustable between 425 and 1450 r.p.m.'s, controls the head's revolutions. The gearhead motor chain-drives a worm wheel, which in turn drives the head. A third electric motor, a 2 h.p. unit, circulates the coolants from a reservoir.

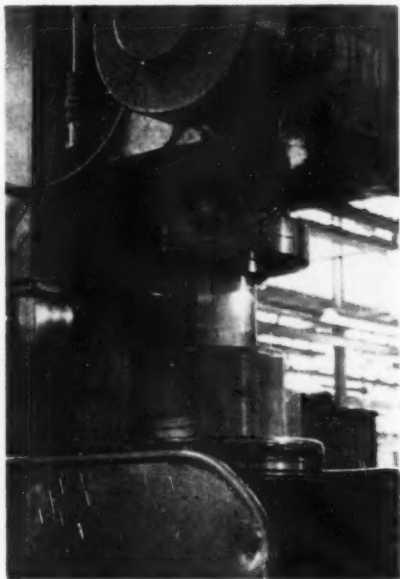
One interesting innovation used in conjunction with this lathe is an overhead mounted ¼ ton hoist, pull-cord controlled, which has a shop-made expandable, 3-piece wooden block device hung where the hook would normally be. The machine's operator, using this device, doesn't have to lift casing into the chuck. He merely lowers the ex-

pandable block device into a casing. As the blocks are raised via the hoist along a tapered metal rod, they expand, fit tightly into the casing, and hoist it. The operator then positions the casing over the chuck, lowers it via the electric hoist and locks it in. Removal of the threaded casing is done with the same wooden expandable blocks. Casings are set on palletized frames for fork-lift movement to the next machining operation.

The lead screw is important in the accurate operation and in threading precision, because it does not depend upon the threads to pull the head and its taps into the work.

Baker's production manager, C. A. McDonald, comes up with the rather

Stamets near bottom of its threading operation. In another second chasers will automatically retract and the head will return to beginning position.





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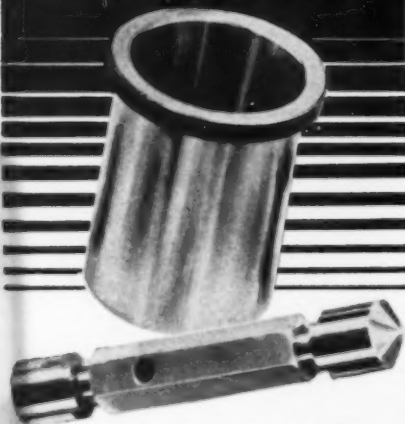
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startling pronouncement that it actually pays to set-up the Stamets for runs as low as two pieces! He bases this contention on the fact that threading a typical casing shoe piece would require about 40 minutes on an engine lathe or similar horizontal internal threader. Yet, set-up time is only 20-30 minutes, even when 12 chasers are used on the head, and when threading the machine's largest diameter work—13 $\frac{3}{4}$ inches. It requires but 12 minutes to make a 5 inch long thread on this size, so the total time is actually shorter even for a 2 piece run than with other machines.

Usually, in Baker's work, four types of oil well casing tubular stock are used: N-80 and J-55, and forgings, SAE 3140 and 1035.

Here are three examples of how the Stamets cuts production time per piece by nearly 75%:

- (1) Internal threading a 13 $\frac{3}{4}$ inch N-80 tubular stock, oil well casing shoe with $\frac{1}{8}$ inch threads, 5 inches of threading, requires but 12 minutes. The thread in this case is round.
- (2) Internal threading a 6 $\frac{1}{2}$ inch piece, $\frac{1}{8}$ inch API round thread, using 6 chasers (instead of 12 with the 13 $\frac{3}{4}$ inch piece), and threading to a length of 5 inches, requires only 8 minutes.
- (3) The same set-up, but threading 8 $\frac{1}{2}$ inch or 9 $\frac{1}{2}$ inch stock (tubular steel, oil well casing) requires about 10 minutes.

Even the micrometer-accurate set-up, involving 12 chasers, can be done with semi-skilled help.

BEARINGS

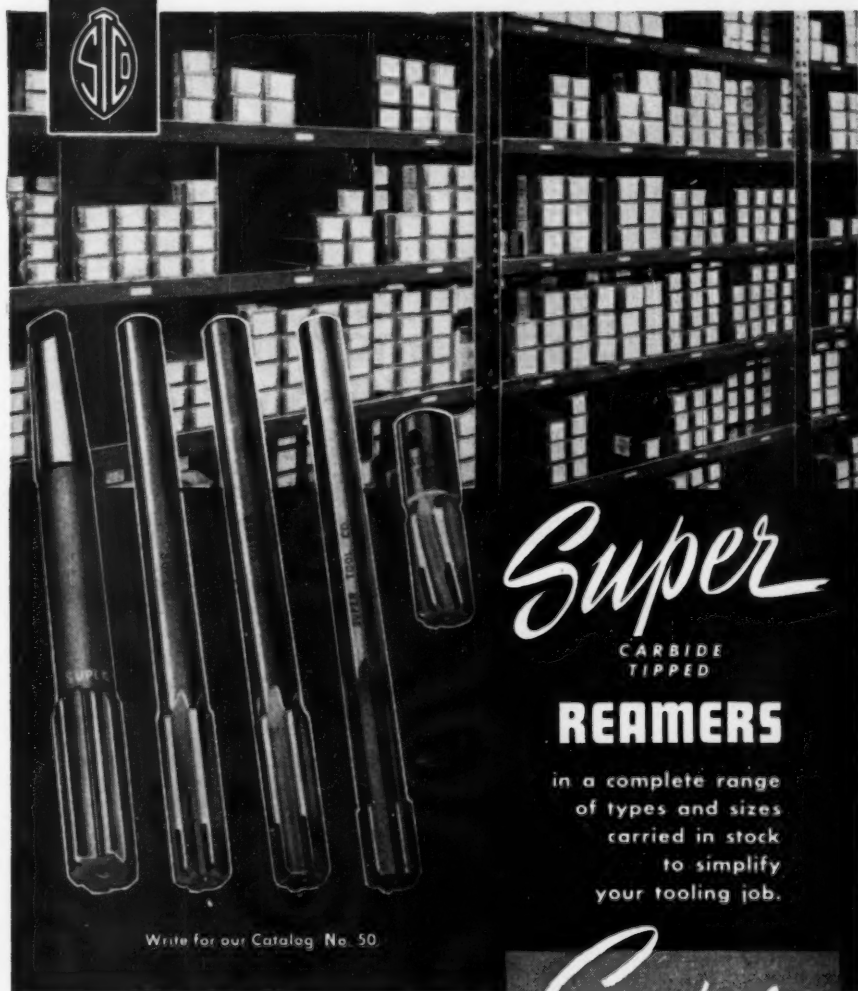
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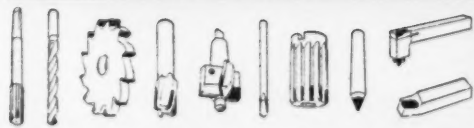
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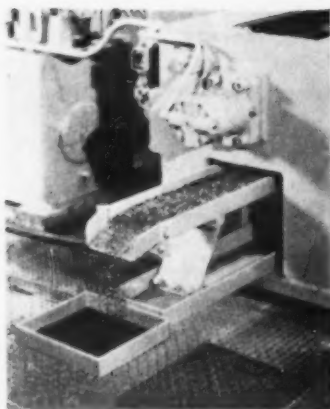


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Oscillating conveyors handle chips and turnings efficiently

by Francis A. Westbrook

TROUGH-TYPE oscillating conveyors are now in use in numerous machine shops for the handling of oily or coolant-soaked chips, turnings, etc., and are proving to be of definite practical value. This type of conveyor consists of a one piece metal tray trough made of No. 10 or No. 12 gauge steel, stainless steel or corrosion resistant metal. The trough is normally 4 inches deep and 8 to 36 inches wide. It is supported by flexible members which act as springs to absorb the energy of its movement at the end of each stroke. The oscillating motion comes from a constant stroke eccentric which provides a continuously uniform flow of material by means of a gentle action obviating any danger of spilling the contents of the trough or of breaking even delicate or brittle objects if it is carrying such, as is sometimes done.

The trough may be 100 feet long, or only a few feet, and several sections of equal or dissimilar lengths may be associated together for a given run. It is possible to have longitudinal dividers whereby different materials may be carried simultaneously. Discharge can be provided for at any point and openings need be only slightly larger than the trough, or trough section, carrying a given material.

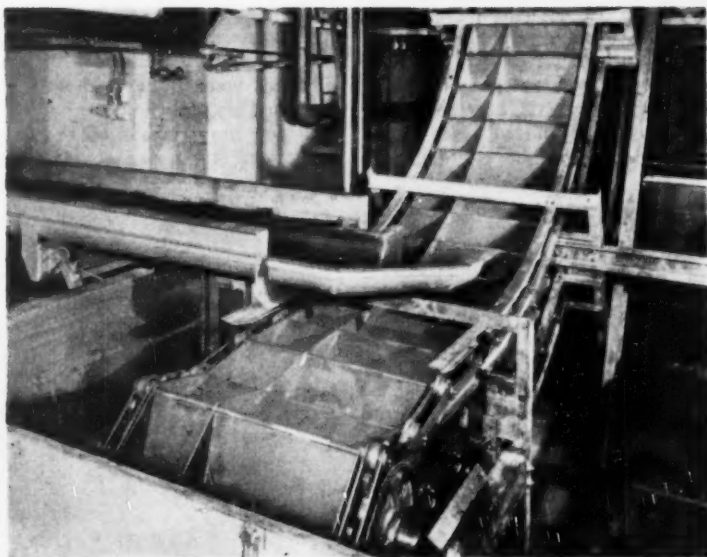
One of the greatest advantages of this type of conveyor is that there is no leakage of coolant or oil drip. Also its simplicity, as compared with a belt conveyor for example, enables it to be installed in short lengths in congested spaces, as under machine tools to catch chips or turnings and deliver them to another similar conveyor, perhaps operating at an angle with the first, which will carry the waste from a number of machines to some central

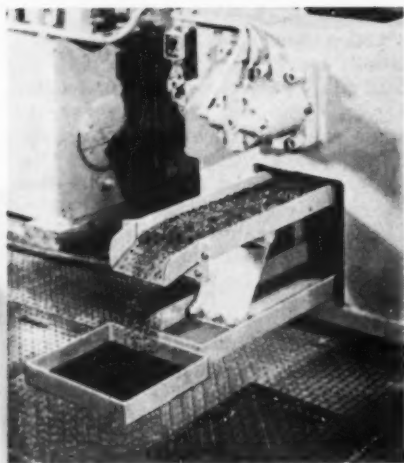
point. Their simplicity also makes it possible to install them under the floor where they will be out of the way.

These conveyors have a long life because they operate at low speed; there are a minimum of moving parts, none in the conveyor trough, and only the drive needs lubrication, all of which makes for low maintenance costs as well. Furthermore, as the flow of chips is continuous and uniform there is no danger of jamming which might cause stoppage of the machines and loss of production. The resilient legs which provide the spring action reduce the power requirement to that necessary to carry the material. The first cost is low, particularly on the longer lengths. Installation and alignment are simple and can be done quickly.

A few examples taken from actual practice will show how these oscillating conveyors are used and will doubtless suggest other applications. Figure 1 shows a short conveyor installed under a machine to collect steel chips and turnings and discharge them to another, longer, and larger oscillating conveyor under the floor for delivery to a central point for disposal. Such an arrangement is of great advantage in a high production metal working shop.

In another shop an oscillating trough conveyor was installed in a tunnel in connection with an oil reclamation and chip disposal system handling 8 tons of chips per 8 hour shift. In this case a 16 inch wide oscillating conveyor 82½ feet long is used to carry crushed





1. A short conveyor installed under a machine to collect steel chips and turnings and discharge them to a longer and larger oscillating conveyor under the floor for delivery to a central disposal point.

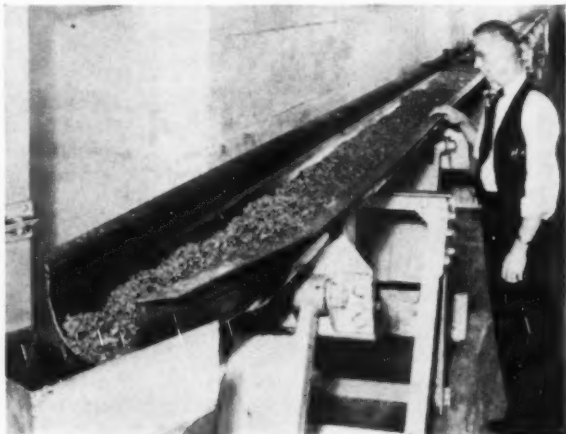
and de-oiled chips from the points where they are dumped through a hole in the shop floor at the centrifuges to a steel encased bucket elevator which loads them into gondola cars on the indoor railroad siding. This installation is shown in figure 2.

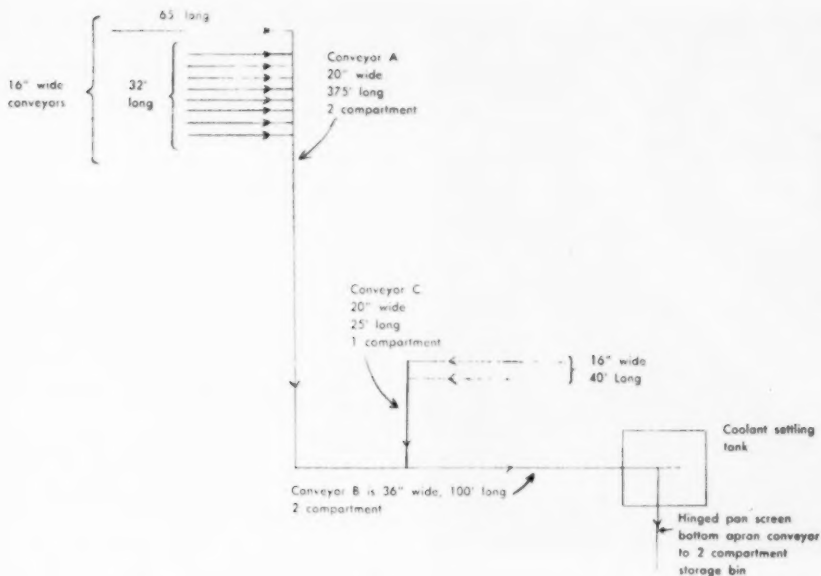
The particular advantage of using the oscillating conveyor at this point is that it was desirable to place it in a tunnel under the floor to facilitate

dumping the centrifuge tubs, to conserve floor space and as the easiest direct means of reaching the elevator at the railroad siding. The simplicity both from the operating and installation standpoints of this type of conveyor and its leakproof and spillage-proof characteristics made it ideal for such a location. In addition, the fact that it needs practically no maintenance in a place difficult to get at unless the tunnel were made much larger, and more expensive, was another very practical consideration.

In a large middle western plant designed during World War II for the manufacture of armor-piercing and high explosive shells with a minimum of man-power, conveyors of a number of types were integrated with the machines. This included mechanical handling for the feeding of the machines, for taking the products away and for

2. A 16 inch wide oscillating conveyor 82½ feet long is used to carry crushed and de-oiled chips from the points where they are dumped through a hole in the shop floor at the centrifuges to a steel-encased bucket elevator which loads them into gondola cars on an indoor railroad siding.





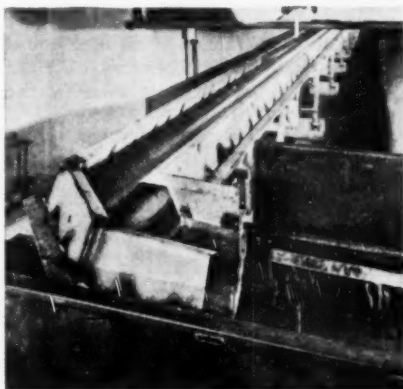
3. Diagrammatic layout of underfloor oscillating conveyor system for gathering steel chips and steel ring scrap.

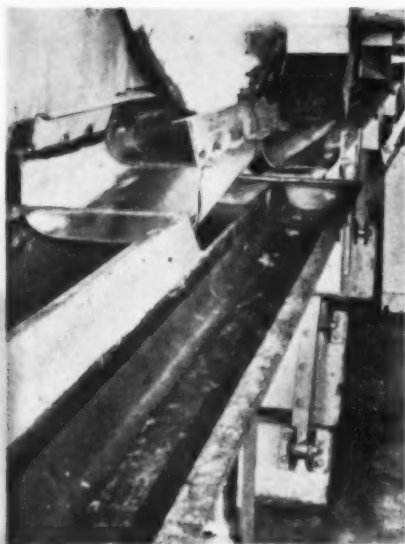
disposing of chips, turnings and coolant. Oscillating conveyors played a very important part in the automatic handling of the three latter items.

With this arrangement, figure 3, chips and turnings, as well as coolant, are taken from the individual machines by means of a number of oscillating conveyors and a hinged pan apron conveyor to a two-compartment bin above a railroad siding inside the building where they are loaded into freight cars.

The oscillating conveyors are all located under the machine shop floor with one conveyor to each line of machines. Chips and coolant from each machine pass through chutes in the floor to these conveyors. There are nine 16 inch wide oscillating conveyors, one of which is 65 feet long and the

4. Oscillating conveyor A delivering chips to one compartment of two-compartment oscillating conveyor B. A is at right angles to B.





5. Oscillating conveyor B handling steel ring scrap in narrow compartment. Note the chutes which deliver scrap to conveyor compartments.

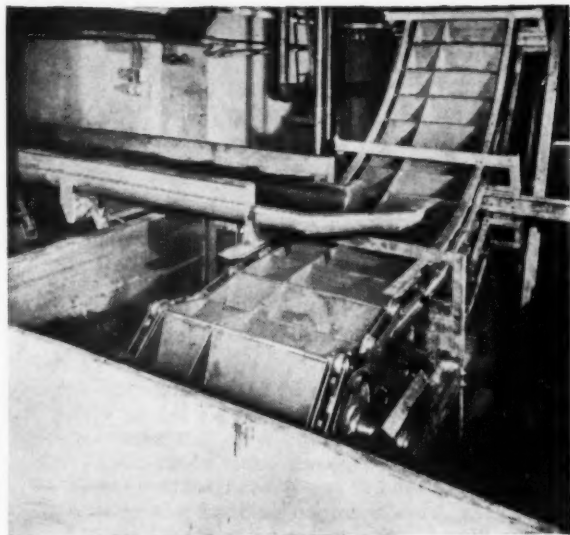
others 32 feet long. They all deliver into a 20 inch wide oscillating conveyor operating at right angles to them and 375 feet long, which will be referred to as conveyor A. The latter discharges into another horizontal oscillating conveyor, to be referred to as conveyor B, which is 36 inches wide and about 100 feet long. This operates at right angles to conveyor A, as seen in the diagram.

Conveyors A and B are each made up of two individually operated parallel conveyors to permit handling of different materials simultaneously without mixing them. Figure 4 shows the point at which conveyor A discharges steel chips into one of the longitudinal compartments of conveyor B, which is at right angles to conveyor A and extends to the right.

There are also two 16 inch oscillating conveyors 40 feet long which discharge into a 20 inch wide oscillating conveyor 25 feet long, referred to as conveyor C, operating at right angles to them and which delivers into conveyor B. The latter is shown in figure 5. It is made double with two longitudinal compartments to permit handling of steel chips and steel ring scrap, plus the coolant, simultaneously and separately. The two kinds of waste are kept separate and delivered to separate storage bins in the railroad car loading house. Steel ring scrap brings a substantially higher price than the chips.

The steel ring scrap is delivered to the proper compartment of conveyor B through chutes from machines located directly over it. The steel chips are delivered to their compartment of conveyor B by the other oscillating conveyors referred to. In figure 5,





6. Conveyor delivers into the coolant-settling tank. The coolant drains through the screen bottom pans into the coolant settling tank while the waste is carried up by the apron conveyor to be dumped into two storage bins.

showing conveyor **B**, the steel ring scrap is in the narrower compartment and reaches it through one of the hopped chutes. Conveyor **C**, near the pipes at the right, delivers chips to the other compartment, which has already received some from conveyor **A**.

The 36 inch wide two compartment oscillating conveyor **B** delivers the two kinds of waste to a two compartment hinged pan apron conveyor as seen in figure 6. The coolant drains through the screen bottom pans into the coolant settling tank while the waste is carried up by the apron conveyor to be dumped into the two storage bins, from which the railroad cars are loaded by gravity.

This fairly elaborate installation sets forth very plainly the manner of using oscillating conveyors and their advantages. In the first place, the fact that no return run is called for is a particularly important consideration when they are installed under the floor because they require only a

minimum of space. Although the conveying is in a straight line, separately driven sections can be arranged at any desired angle with each other. There are no conveyor joints to be worn by abrasion and no parts moving with respect to each other except the drive, which is the only point requiring lubrication. This is also important with the conveyors under the floor where they are not so readily accessible for servicing and maintenance. Another advantage of oscillating conveyors is that less drop is needed when discharging from one section to another set at an angle than with belt and apron conveyors, which means less space in an underground or underfloor layout.

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The End

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Blanchard Grinders, with proper grinding wheels, can and do give high production with extremely close tolerances for dimension and flatness. However, a No. 11 Blanchard user recently received erroneous advice on abrasive wheels from an outside source. The result was that 35 high-speed cam plates were ground on both sides in 1½ hours with surface finish of 24 micro-inches.

By referring the problem to Blanchard, it was easily demonstrated that the No. 11, with correct grinding wheel, would give desired results—90 to 100 cam plates per hour, with surface finish of 4 micro-inches, dimension tolerance of $\pm .0002$, and flat within 2 light bands.

Blanchard wheels are best for Blanchard Grinders — let Blanchard give you the benefit of their vast experience so that you too can get the most from your Blanchard machines.

Information on correct surface grinding procedure and wheel selection are given in "Work Done on the Blanchard" and "The Art of Surface Grinding." Write for free copies today!



*"PLEASE CONSULT THE
ENGINEERS WHO DESIGNED ME,
AND LET THEM SPECIFY THE
CORRECT BLANCHARD WHEELS,
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When making drawings Practical Dimensioning can save you time and money

MANY DRAWINGS fail in their prime functions to tell the machinist exactly how to make the part without waste effort, and how to make the part so it will function as intended. These failings are usually the fault of improper dimensioning, a fault which we have tried to overcome with a system of practical dimensioning.

Most dimensional errors can be listed under the following four headings: (1) Accumulation of tolerances; (2) tolerances to too close limits; (3) improper choice of dimensions; (4) failure to dimension from similar base lines on mating parts.

Recalling some of your own experiences with dimensioning errors of these four types will impress upon you just how much these errors can increase the cost of a part.

To illustrate some of these dimensioning errors, let us consider the cast iron stop block shown in figure 1. Much



by Edward C. Helmke

Assistant Service Manager

Gisholt Machine Company

Madison, Wisconsin

of the machining on this block is for appearance only. The angle at the lower end of the block is for clearance, and the slot in the upper half of the block supports the pivot point of an air cylinder. This block is made in rather small quantities, and consequently not much money can be spent for tooling.

With the horizontal spacing of the bolt holes dimensioned as shown, a total spacing variation of plus or minus 1/32 inch could result which would take up

Ed. Note: Problems of this type are thoroughly discussed in the 40-page booklet PRACTICAL DIMENSIONING. As a service to industry a single sample copy of this booklet will be mailed free to anyone writing in on a business letterhead. Additional copies are available at a nominal charge. Please write directly to The Gisholt Machine Company, 1221 East Washington Ave., Dept. BB, Madison 10, Wis.

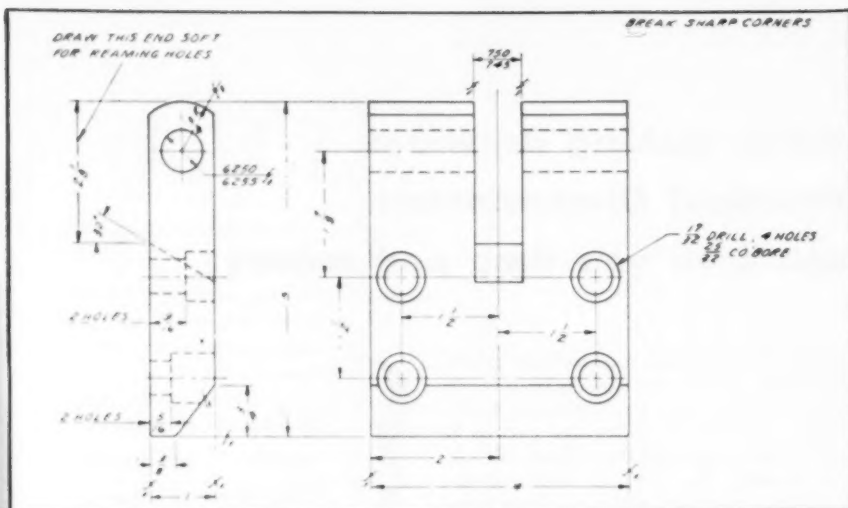
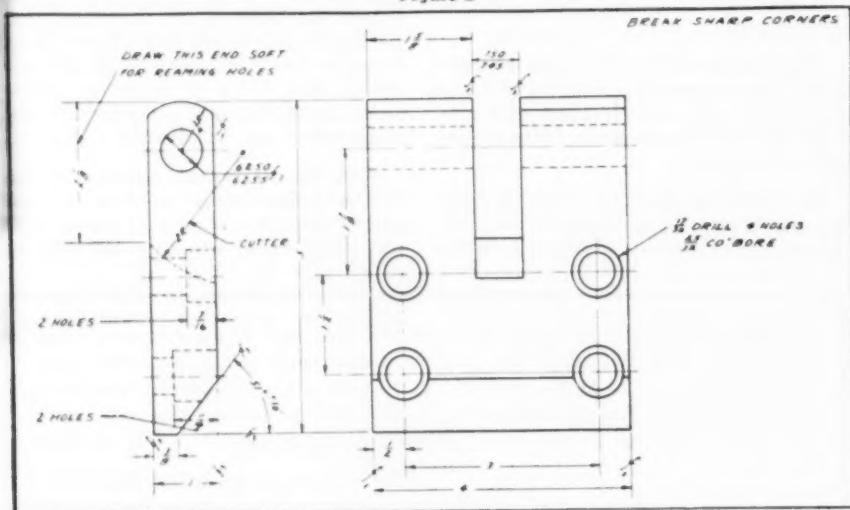


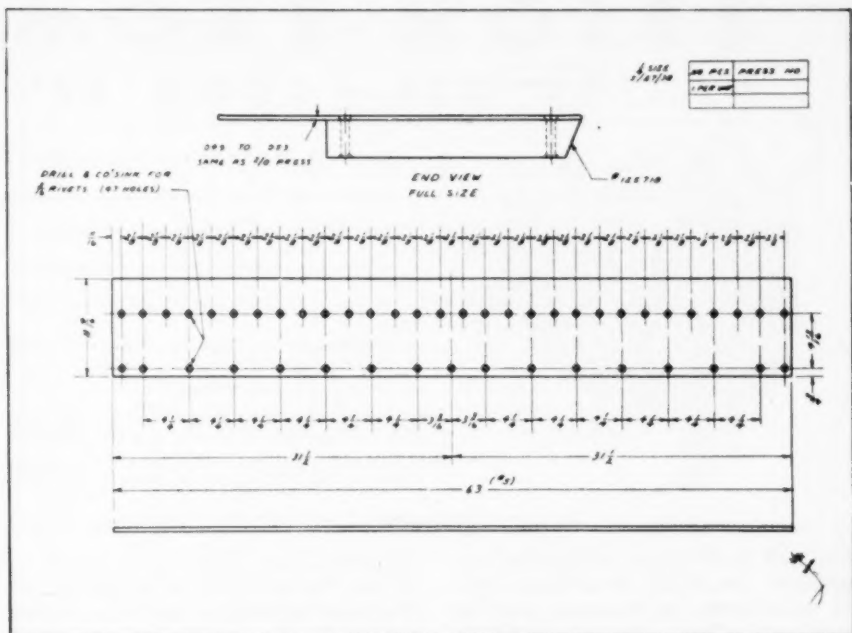
Figure 1

all the clearance provided by drilling the bolt holes $1/32$ inch over-size. Then when this spacing variation is applied to both rows of holes, with the possibility of the variation existing in both

directions, it can readily be seen that the bolt holes will never fit the previously drilled and tapped holes in the mating part. If the holes are made to fit by slotting one or more of them

Figure 2





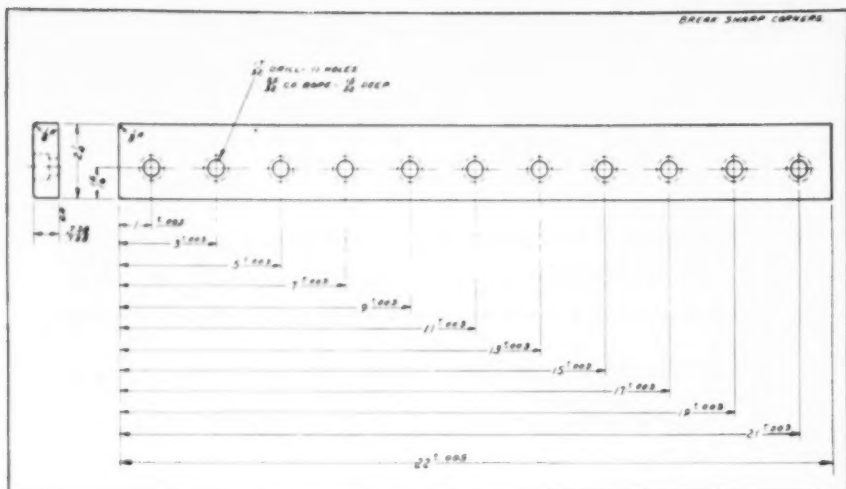


Figure 4

tor. This factor could perhaps be more properly designated as a design error or as an error in judgment, and can best be described in the following manner: since this is merely a stop or support block, it is not essential that the block be exactly 1 inch thick and 4 inches wide. The block would perform its function just as well if it were only $7/8$ inches thick and $3-7/8$ inches wide. In this latter case, the block could have been made from $1-1/4 \times 4-1/4$ inch steel. This would have saved approximately 1-3/4 lbs. of steel per block, and would reduce the amount of stock to be removed by more than half, thus reducing the machining time. In other words, substantial material and time savings are possible on simple stop blocks, collars, etc., on which one or more of the outside dimensions are not critical, if these dimensions are chosen so that the part can be made from the nearest stock bar or extrusion.

Figure 3 shows a most obvious example of the accumulation of tolerances that can result from "chain dimensioning." These parts are made in very small

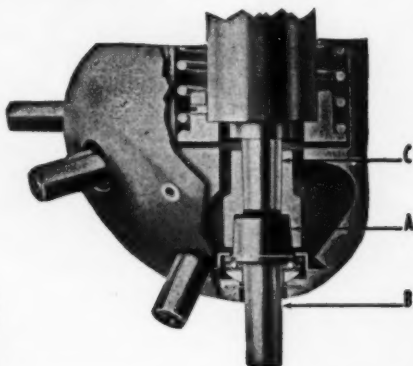
quantities and when dimensioned as shown, the machinist, in laying out the horizontal spacing for the holes, would set his dividers for 2-1/8 inches, and would then step off the 29 spaces to locate the holes on the upper center line. If he missed the divider setting by only .005 inches, the total cumulative error by the time the last hole was reached would be .145 inches. The .005 error in setting the dividers would not be unusual since the workman would be setting his dividers to a 6 inch scale graduated in 64ths of an inch.

Figure 4 shows a recommended method of dimensioning a series of holes. Here all dimensions are given from the left hand end of the part. All dimensions are actual scale readings and no addition or subtraction of dimensions is required. Consequently, no tolerances can accumulate, the possibility of shop errors has been greatly reduced, and the part can be made inexpensively and will be interchangeable.

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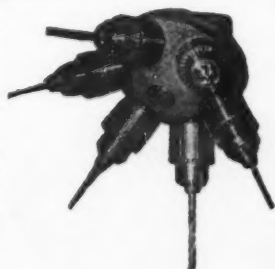
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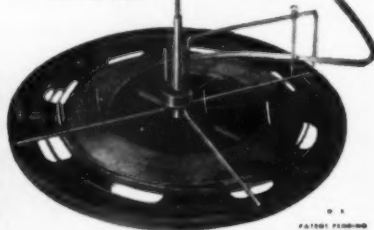
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U.S.
PATENT PENDING

Air cylinders mounted on milling table double operator output

IN EVERY industry there exists the possibility of substantial production savings through the use of compressed air operated mechanisms. Most of these devices are the result of observing a manual operation and translating to operation by compressed air.

An excellent example of this type of air application can be seen at Barth Stamping and Machine Works, Incorporated, of Cleveland, Ohio.

Barth makes rather extensive standard uses of air, such as air-operated stamping machines, air jets for parts ejection, air hoists, portable air tools, and others. Availability of this flexible power source prompted a rather ingenious "home-made" innovation on the part of one of the plant engineers.

One of the steel stampings which Barth processes requires the milling of radius, figure 1. Barth designed a fixture to hold these pieces for milling. This fixture can be seen in figure 2. The four pieces placed in the fixture require clamping to assure correct location for the form milling.

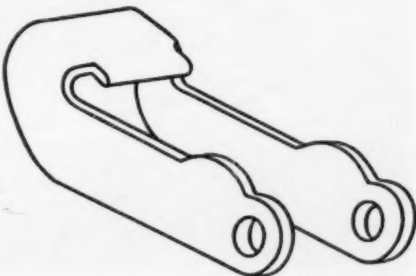
Not too long ago, the clamping was accomplished manually. An operator would force an L-shaped rod through the holes in the stamping and would also tighten down the bolts G, to apply

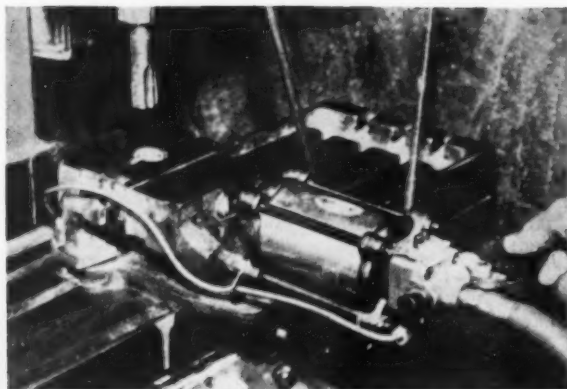
clamping pressure on the crosspiece of the stamping. This took time and fatigued the operator who could work only one machine.

Four small air cylinders and a simple copper tubing air circuit cut production time in half.

As can be seen in the photograph, the entire air device is mounted on the milling table. The five air cylinders A and B are provided with rod extensions. Movement of valve lever C results in a simultaneous advance of both piston rods through the stamping holes. Two other cylinders (D is the only one seen in the photograph), are mounted vertically behind the fixture. Movement

Small steel stamping used as automotive transmission part requires milling of small radius over length of crosspiece.





Simple air-cylinder clamp to speed milling operations at Barth.

of valve lever **E** actuates these cylinders whose rods move upward applying a clamping force through the plate **F** and onto the crosspiece of the stamping. Thus held, the stamping can be accurately milled. The operator has been freed of the previous manual clamping operations and is able to work two machines, doubling his output.

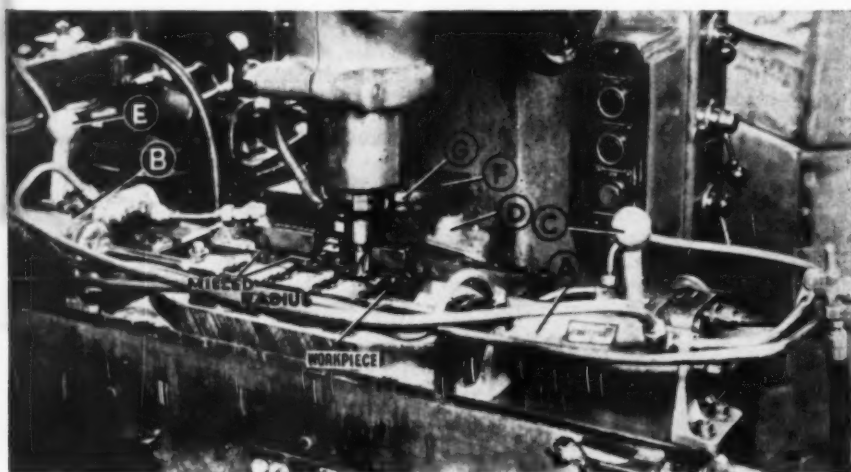
Air-operated clamping to boost out-

put is used in parallel manners throughout the plant. Figure 3 shows a simple air-operated clamp which has simplified fixture loading, provided a semi-automatic set-up, minimized time per piece and multiplied operator output.

Data and photos courtesy Compressed Air and Gas Institute

The End

Principal components of air circuit which correctly locates and holds stamping in fixture for milling.



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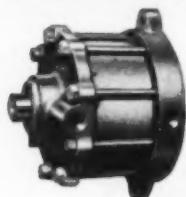
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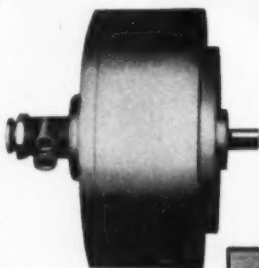
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A Blueprint for Manpower Mobilization . . . part 6

By

Edmund Mottershead,

Mottershead Associates

SECTION 1

Revamp plant communications

Top management is becoming increasingly aware of the fact that a great deal of efficiency and productivity of a given labor force is lost when communications within and without the plant are not adequate and effective. The tight labor market situation makes the solution of communications problems more important than ever before.

The tools and fixtures that somehow are not quite right—the blueprints lacking key dimensions or which must be converted back and forth from fractions to decimal equivalents—the machine operator who strenuously and conscientiously produces high quantity but has a high rate of scrap—the human relations problems that pop up ranging from disciplinary matters to long-term departmental feuds—the friction that occurs between quality control and production, between foundry and machine shop, between engineering and the tool room—all these are but a few of the trouble spots that develop where communications are faulty.

On the face of it, communications in a modern plant would seem to present no particular problem. Install telephones, stock up on memo pads, hire people who can read and write, and you have a communications system. Nobody

familiar with the complexities of modern industry subscribes to such an oversimplified view, of course. But there are still many who don't fully appreciate the vastness and the complicated nature of communications in modern plants.

One of the common misconceptions is that communications consists primarily in the dissemination of information and thinking, rather than the exchange of ideas. F. J. Roethlisberger, in a recent issue of the Harvard Business Review, points out that: "The biggest block to personal communication is man's inability to listen intelligently, understandingly, and skillfully to another person." This would seem to strike the heart of the matter; in order to have understanding between all elements of management and working force—and therefore co-ordination of effort—there must be as much listening as telling, as much reception as expression. Further, there must be as much opportunity for all elements of the plant team to have their say as there is for them to receive information and ideas.

Initially, an analysis of the plant's organizational and departmental structure, of its production planning and of the bottlenecks that occur, must be made in order to see what kinds of communications are needed. Are there adequate horizontal channels established between members of top management, between foremen and supervisors and between the workers? Are there effective means of communication between these various levels—are the vertical lines between worker and foreman or foreman and top management as "open" as the horizontal lines? And, most important, are these lines—all of them—

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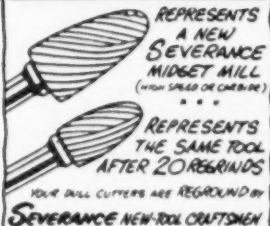
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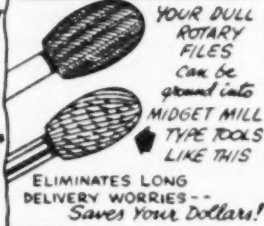


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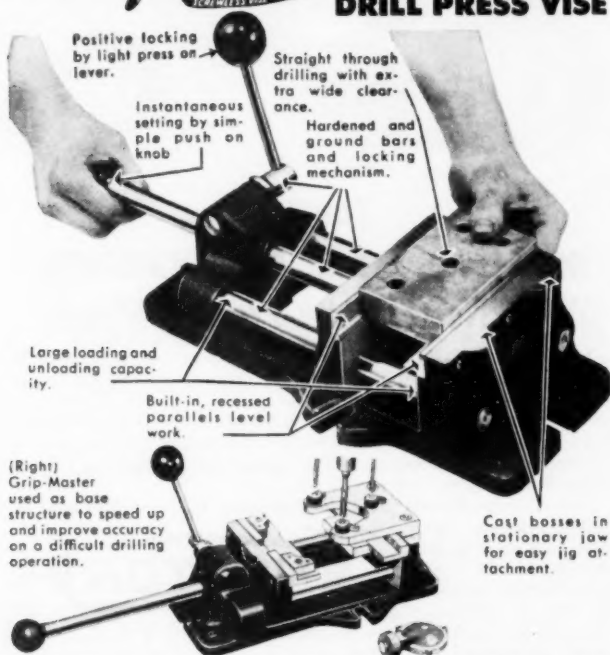
two-way? Can any given element reply as easily as it can be reached?

The technical means of communication are neither numerous nor complex; written memo notes, phone conversations and face-to-face discussion are the essential elements. The trick is to plan and organize these elements in the particular way that suits your needs. Telephones aren't installed just any place; a decision is made as to just where they do the most good. Notes

aren't just written by anyone on whatever scrap of paper happens to be around; memo pads are procured and placed where they are of most value. And people don't run around buttonholing whomever they happen to run into; foreman meetings, foreman-worker meetings and staff meetings are organized—certain times and places are set aside to give all members of the plant team adequate opportunities to exchange information and thinking.

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Obviously, all modern plants have done, and are doing, a certain amount of this kind of planning. But more emphasis should be placed on the need for exchange, rather than dissemination of ideas—for listening and replying, rather than just telling.

Aids to communication

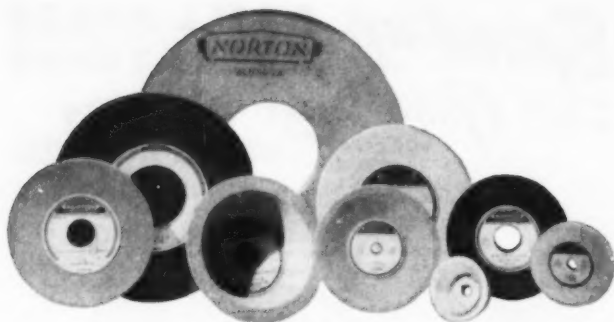
There are certain legitimate auxiliary tools and devices of communication which management uses to promote comradeship and understanding among

all plant people, to disseminate more factual information and to facilitate good community relations. These auxiliary elements include:

Employee house organs; supervisor's policy manuals; company's annual report; orientation and training programs—information booklets; bulletin boards and suggestion boxes; recreation programs; open house programs and public displays.

Employee house organs

The employee house organ can be any



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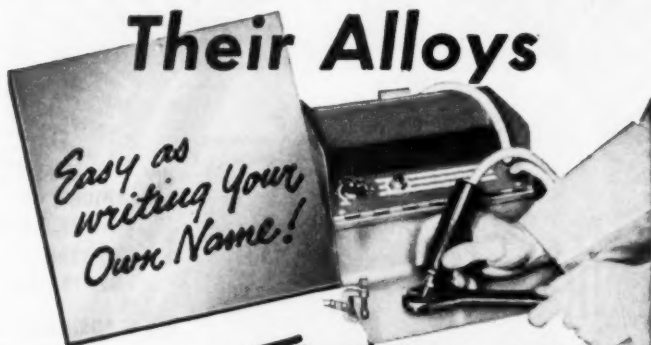
one of a great many different types and still do the basic job in personnel relations it is designed for. It can be a large, slick, picture-filled type, or it can be a one-page mimeographed first effort of a small company. What matters is that it develop reader interest, and that it promote company loyalty, product understanding, and good human relations. For the small company, a one-page quarterly put out by the personnel director is infinitely better than no pub-

lication at all. However, even for the small company, regular publication—so that employees develop readership interest—is important.

Supervisor Policy manuals

Supervisor manuals insure unaltered transmission and daily administration of top management's policies and provide an authoritative reference guide that stays on the job. Line and staff roles in each activity are clarified; the fore-

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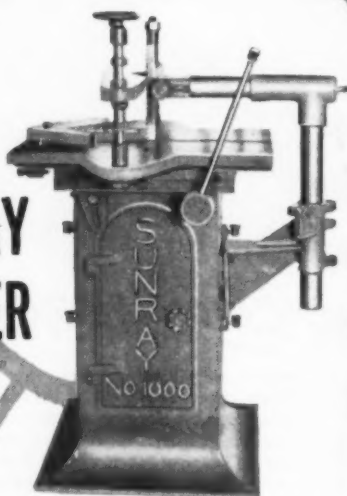
man's identification with top management is strengthened, and the personnel job is done at the point of employee contact—in the plant. The manual defines the extent to which the foreman can act on his own, and indicates situations in which he must seek prior clearance from above.

Company's annual report

The annual report is not often thought of as a means of "humanizing the business," but this is precisely one of the

important things it can do. After all, what is it that gives rise to the motion that a modern concern is a mysterious, impersonal "monster" which goes its own way and somehow exists for its own sake alone? Obviously, this is a ridiculous view—somewhat like that of an infant toward a racing locomotive. As the child sheds his silly notions about the train when he learns that an engineer controls its movement and that it has a planned destination, so the average man sheds his misconceptions

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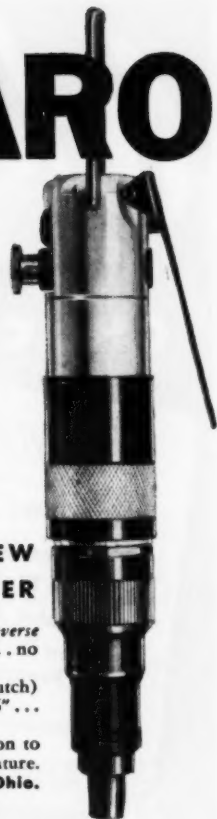
about the modern company when he comes to know its objectives, its organizational structure and the vital role human beings play in its functioning. The annual report, in giving information about the company, where it is going and how it is getting there, does much to create good will through understanding—to "humanize the business."

Orientation and training programs—information booklets

The orientation and training programs of companies today offer a wonderful opportunity for top management to communicate to the worker effectively about a great many things besides where the washrooms are located and how to operate a particular machine.

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A good job of selling the company to the new worker can be done with a little careful planning. The virtues of the company can also be sold to the worker's family—a letter can be sent to his home welcoming him to the working force; information booklets with extensive explanations of such things as fringe benefits, overtime policies, wage payment plans and product information often are taken home where they do a fine public relations job on the family;

full utilization of such audio-visual methods as films, slides, charts and records can effectively promote general understanding of the company and an enthusiasm that often gets the worker talking to other members of his family about the company.

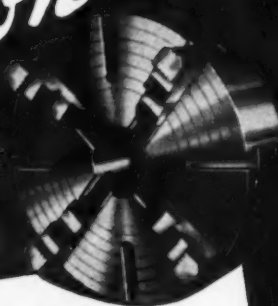
Bulletin boards and suggestion boxes

Plant bulletin boards can be an extremely effective means of creating

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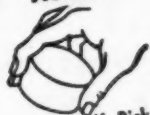


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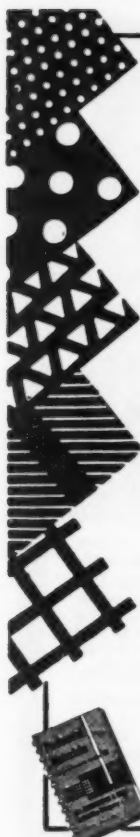
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THE WHITON MACHINE COMPANY
NEW LONDON, CONN.

good will. It has been found that more interest is maintained if the material used is primarily local. The boards should be changed regularly and often if readership interest is to be maintained. When it is feasible, it is wise to welcome employee participation. Such items as unusual snapshots of workers on vacation should be used whenever possible, and results of plant

league games and future schedules are of interest to many workers.

Suggestion boxes, despite the sometime ridiculous responses, are valuable morale builders. They give the worker complete freedom to let off steam—to give vent to pent-up feelings by "telling the boss" how to do the job. The benefits gained by a suggestion system, aside from the valuable ideas sometimes received, are largely intangibles, but they are nevertheless real and important.



Investigate the Advantages of **H & K** PERFORATIONS

— for cleaning, grading, straining and filtering . . . guarding and ventilating . . . acoustical treatment . . . ornamental enclosure, and related problems of product and machine design.

You have a wide selection of patterns to choose from, all accurately perforated. For commercial processing, perforations may be had with as close as $\pm .0005"$. Materials include practically all metals and sheet materials such as plastics, fabrikoids, plywood, etc. Ornamental grilles may still be furnished in steel with painted finishes.

Perforated sheets may be furnished rolled, formed, sheared, welded, brazed or otherwise fabricated to your specifications.

The Harrington & King
PERFORATING CO.

Catalog No. 62
tells the "hole" story
—write for it!

5635 Fillmore Street, Chicago 44, Illinois
114 Liberty St., New York 6, N. Y.

Recreation Programs

For a long time it has been feared by many that television would wreck plant recreation programs. However, a little care in planning has avoided the scheduling of events on the nights the popular TV shows appear, and recreation programs are still going strong. Workers still enjoy their bowling nights and softball afternoons with their fellow employees.

No plant should underestimate the

employee relations job a recreation program can do. In a sense, these programs help make every worker a salesman of your company's virtues, but the programs should be planned wisely and promoted extensively. House organs, orientation and training programs and bulletin boards can all be used to good advantage here.

Some of the activities sponsored by plants throughout the country are: bowling teams, basketball teams, boxing clubs, chess and checker clubs, riding

SEPARATE DIE SETS...

This Fast, Simple Way

Here's the equipment you need for building or repairing dies and mounting or fitting punches. It eliminates difficulty of separating die sets. It keeps skilled mechanics happier, saves their valuable time and increases productivity.

Acro Die Set Pullers remove punch holder from the die shoe by a straight upward pull . . . punch holder travels upward leaving both leader pins simultaneously.

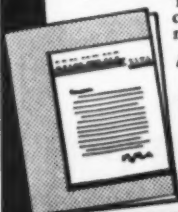
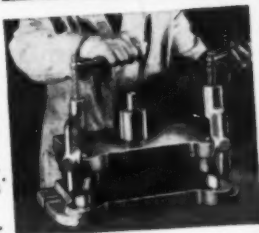
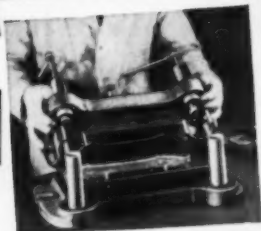
Die shops and industrial plants now using Acro Die Set Pullers have saved as high as 50% in time alone. This is especially true on large dies where the continual separating of die sets for aligning and mounting of punches slows down the tool maker.

Attention Dealers: Some territories available.

**WRITE FOR
FREE
BULLETIN**

Write for complete information on these time-saving die set pullers. Ask for bulletin BB-109.

ACRO METAL STAMPING COMPANY
332 E. RESERVOIR AVE. • MILWAUKEE 12, WIS.



clubs, rod clubs, glee clubs, girls' clubs and horseshoe tossing competitions. Of course, not all companies can sponsor such a wide variety of events. It is to the company's advantage, however, to sponsor as great a variety of activities as it reasonably can.

Open House programs and public displays

The time and effort involved in planning open house programs have, in many instances, made top management

dubious about the value of such programs. It has been found, however, that in situations where strong community relations effort is needed, the open house can do an excellent job of educating the workers' families and the community in general about the organization, methods and aims of a plant. The open house can either be confined to workers' families and friends or be thrown open to the public. Either way, whether you are trying to do primarily an employee relations job or a com-

Visit the
Nelco
booth
at the
Philadelphia
Metals
Show —
Oct. 18-24.

LET'S TALK FACTS ABOUT FACE MILLS!

"This NELCO solid-brazed, carbide tipped mill is the best tool we've got. We get the most for our money — it's solid, rugged and dependable . . . gives better finishes, higher table feeds and turns out more work between grinds. Boy! It's a Honey!"



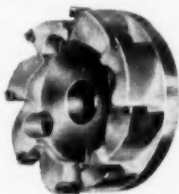
HERE'S WHY... 2 or 3 solid-brazed face mills cost less than 1 inserted blade type! The same initial investment provides 1 or 2 spare cutters which can be used for production while grinding the original.

There's less chance of damaging rugged, one-piece solid-brazed type cutters. No moving parts to keep aligned! . . . No loose parts to shatter, to injure workers when accidents occur.

A SOLID tool has to work to closer tolerances! It's fact.

THESE ARE FACTS!...

Solid-brazed cutters can be repaired quickly when damaged — No costly machined body to be re-worked or replaced. 1 blade for an inserted type cutter costs as much as 3 to 5 replaceable solid carbide cutter tips. The solid-type face mill has up to twice as much usable carbide. THEREFORE — SOLID-BRAZED FACE MILLS GIVE YOU — MUCH LOWER INITIAL COST — LOWER MAINTENANCE COST — FASTER PRODUCTION — CLOSER TOLERANCES — GREATER SAFETY and LESS DOWN TIME!



NELCO TOOLS

*For that Extra
Edge in Production*

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

munity relations job, the open house is a most effective means to employ.

The public display, either in a prominent window of your plant or in a conspicuous place in the center of town, does a fine job of educating the public about your plant and product. You will have to experiment a bit to discover which aspects of your operations and products have the greatest general visual appeal. Then, you can go to town

and peg your entire displays around these eye-appealing attractions. Like bulletin boards, displays should be changed regularly if public interest is to be retained.

The auxiliary methods outlined above are important facts of any plant's communications system, but it should not be forgotten that they are primarily one-way channels. True communication involves the **exchange** of information

and thinking, the give-and-take attitude of all elements in the plant and, most important of all, the willingness of all members of top management, supervisory force and operating per-

sonnel to **listen**, as well as to **express**. As Josh Billings said, "A man is a bore when he talks about himself so much I can't talk about myself."

Check list on auxiliary tools of communication

DO YOU USE—	Y E S	N O	HOW EFFECTIVE IS IT?		
			COULD BE BETTER	ADEQUATE	THE BEST
Employee House Organs					
Supervisor's Policy Manual's					
Company's Annual Report					
Orientation and Training Programs—Information Booklets					
Bulletin Boards and Suggestion Boxes					
Recreation Programs					
Open House and Public Displays					

To score your plant's communication system, count ten points for each "best" answer, seven points for each "adequate," four points for each "could be better" and subtract five points for each "no."

If your total is: Under 30 points, you had better start planning right away; 30 to 45 points, there is still room for improvement; 46 to 60 points, keep up the good work; 61 to 70 points, yours is really a model communications system!

MICRO MINIATURES



Will Help You Solve Your Small END MILL Problems

We specialize in sizes from .1875 down to ?

**PRECISION GROUND
FROM SOLID**

- POLISHED FLUTES
- FASTER CUTTING
- LONG LIFE
- STRENGTH

WRITE FOR CATALOG

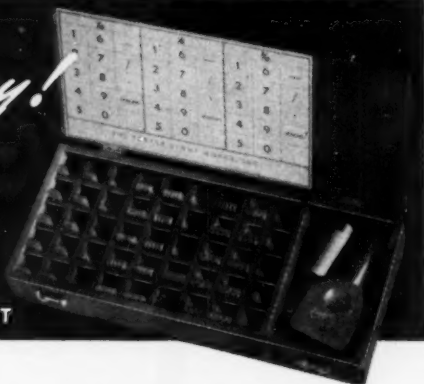
WOODSON TOOL CO.,

● 4811 Lennox Blvd., Inglewood, Calif.

NEW MARKING FLEXIBILITY

*and
Economy!*

#169
STEEL NUMBER SET



With PARKER Type Holders and Interchangeable Steel Type Sets

Set hand or press markings quickly, easily to meet each day's changing needs. Parker Type Holders and Steel Type Sets assure new flexibility, making any required stamp available *in seconds*. Part numbers, dating, inspection numbers—a press or hand marking stamp for any material, any job is always at your fingertips. Number, and number and letter sets are scientifically compiled to permit the widest versatility, largest number of words. Threaded shank is furnished to allow hand stamp to be made into press stamp in an instant. Each set is crafted with traditional Parker skill to guarantee years of clean, permanent stamping—the convenience and utility of many dies in *one* economical unit.

Write TODAY for literature and prices on the
many dollar saving Parker type sets available.



Tighten up production controls for surer profits!

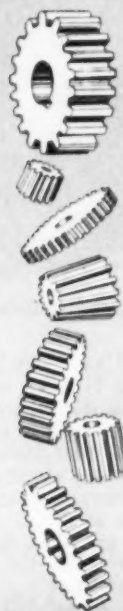
SECTION 2

Labor costs are probably the most flexible item in any departmental or production budget. When allowed to get out of control, they can quickly exceed original cost estimates and create loss instead of profit. Both the greatest

wastes and the greatest savings can be effected in labor through effective production control.

Such control of labor cost, however, with or without effective production control procedures, is never the sole responsibility of the foreman or supervisor. Instead, it requires the close cooperation and coordination of the entire industrial team: sales force, design and engineering personnel, procurement

GREAVES-SILENT BAKELITE GEARS



THEY'RE STRONG, SILENT!

You'll appreciate the smooth, silent operation of Greaves-Silent Bakelite Gears. You'll marvel at the big power loads they can carry . . . and their remarkable ability to operate successfully when completely submerged in water. Cost is low so you'll save plenty of time, money and labor. Silent gears of rawhide and Fabriol also available.

• WRITE FOR CIRCULAR



**IMMEDIATE
DELIVERY**
on blanks sawed
to specified dia-
meter and face

★ **GREAVES**

THE GREAVES MACHINE TOOL CO.

2600 EASTERN AVE. CINCINNATI 2, OHIO

departments, and personnel department, as well as production groups.

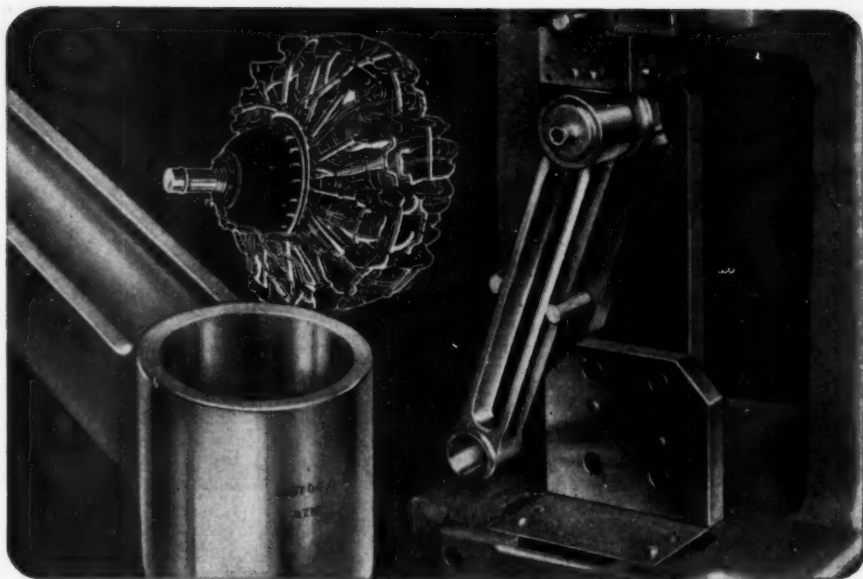
Sales forecasting the key

On the basis that even a rough plan is better than none because you can see where you ought to be even though you aren't there, even a rough job of sales forecasting makes production planning and control easier than no forecasting at all.

Assuming that within reasonable limits, an estimate is made of how much can be sold in a given period of six

months or a year, production budgets can be set up covering every department and factor, so that routing, scheduling, and dispatching can be carried out effectively.

Companies such as Bell & Howell, Thor, and others which manufacture a "line" of standard items, carry such procedures of forecasting and subsequent budgeting to great detail. It is usually easier to do this in line or high-production operations than in job-shop situations. However, job-shops can to some extent work out such budgets in



Roll-O-Mark saves 527 hours per month on Single Precision Marking Operation

This important saving is reported by a leading aircraft engine manufacturer on marking linkrods with the all-pneumatic NOBLEWEST Model 50P1. This new marking machine, named the Roll-O-Mark, is the leader in the medium priced general purpose marking machine field. It utilizes the original NOBLEWEST roll-marking process which permanently rolls in inscription

markings that last as long as the product itself. Roll-O-Mark is ideal for trade marking, part or patent numbering, codifying and serial numbering and will mark flat or round surfaces. For information on how Roll-O-Mark and other NOBLEWEST equipment can cut costs in your plant, write The Noble & Westbrook Mfg. Co., 9 Westbrook St., East Hartford 8, Conn.



What are Dies?

Production proved dies save thousands of dollars—thousands of production hours for B. Jahn customers—every day!

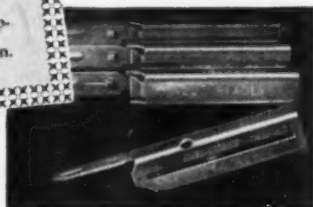
How are these tremendous savings obtained? By a few simple, honest words: —————>

This B. Jahn built die is guaranteed to run in the customer's equipment to his complete satisfaction.

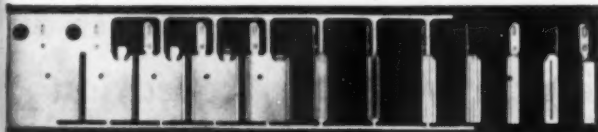
A simple guarantee — a simple statement of fact, but backed up by the additional promise to deliver a die strip and 10 or 50,000 PRODUCTION PROVED died parts or components for customer gauging, production use and approval.

Here is a positive method of eliminating all error, all chance, all uncertainty when you buy tools and dies.

Let B. Jahn's 165 designers, engineers and toolmakers put their 2475 years of experience to work for you.



50,000 Razor Blade Holders — being PRODUCTION PROVED in the B. Jahn plant. Progressive die produced 50 complete holders per minute, total run is to be millions.



Strip from 10 station progressive die built to produce Eversharp Shick Injector Razor Blade Holders. This strip and component parts were submitted to customer for approval.

*Investigate B. Jahn
and Invest in
Production Economy*

Send for the
story of
B. Jahn
PRODUCTION
PROVED
dies
TODAY!

B. Jahn

THE B. JAHN MANUFACTURING COMPANY • NEW BRITAIN, CONNECTICUT

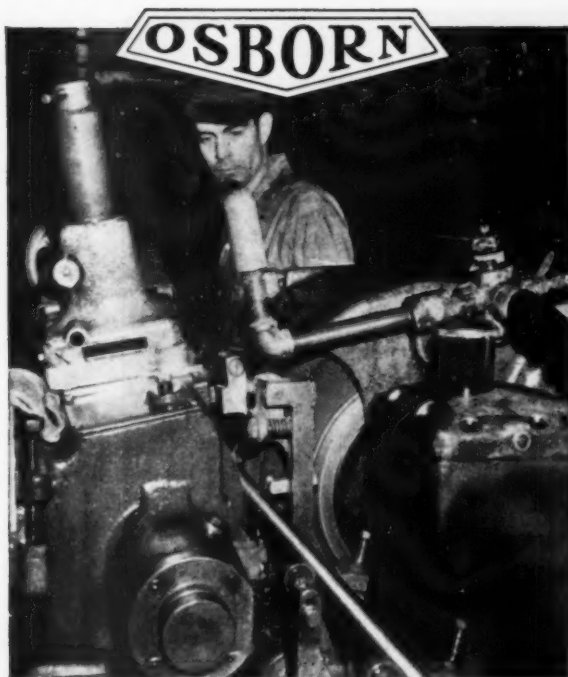
reverse, starting from known production capacity and selling up to that point before complications in production and delivery raise costs.

Planning and design are inter-related

The function of production planning, to determine what shall be produced at what cost, is inevitably linked to design of product materials selected. Conceivably, a product can be designed which people would buy, but to be made of a material which could not

be processed economically or accurately in the plant with existing equipment. Or, its use would involve skills the present labor force does not have.

Budgeting production in terms of both time and units as well as costs is essential to coordinating production with sales, the financial condition of the company, and with delivery schedules and promises. Production budgets should be set up for definite periods. Some one person or department must accept final responsibility for preparing estimates, setting the budget, mak-



Finer finish... longer product life with Centerless Brushing

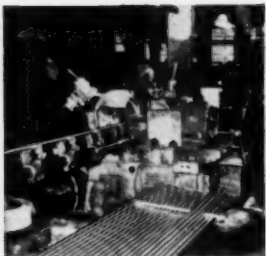
This machine does double duty. For removal of metal to close tolerance, it is a *centerless grinder*. Then, for finishing the surface to micro-smoothness it is a *centerless brusher*. Its conversion takes only a few minutes.

In the operation shown above, nickel-moly steel rods for pumps, are being finished by an Osborn Fascut Brush. Prior to brushing, the same machine with a grinding wheel in place of the brush made a rough grind, taking off .006 inch, and a finish grind, taking off .002 inch. Results of the Centerless Brushing: Produces a smoother finish. Reduces wear in pump packing. Reduces corrosive action on rods; makes them last longer.

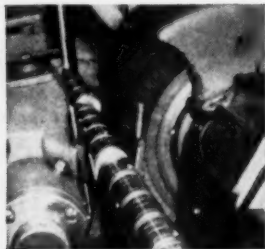
An Osborn Brushing Analyst helped develop this improvement. Ask your OBA to help you on all problems of cleaning and finishing! Call him today or write *The Osborn Manufacturing Company, Dept. 819, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brushe

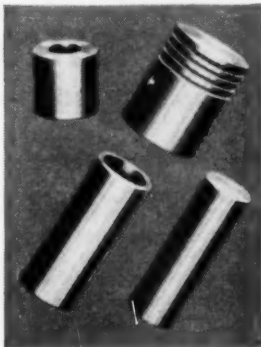
OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES



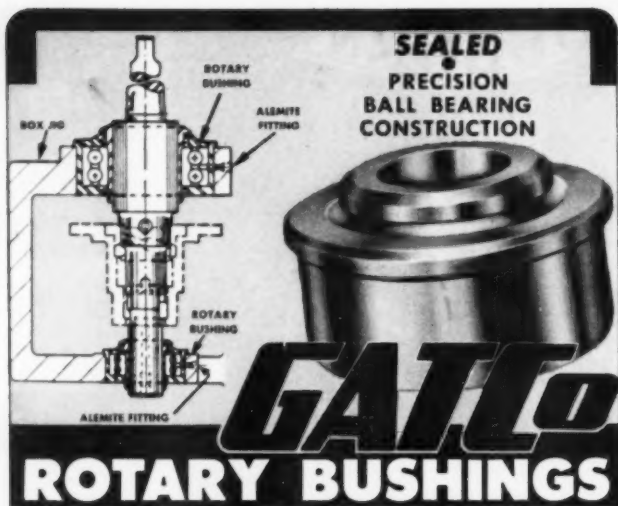
THE SET-UP. This shows the centerless grinding machine which also serves as a "centerless brusher". These pump rods vary from 1 1/4 in. to 1 1/2 in. diameter ... from 6 ft. to 36 ft. in length. Regulating wheel speed is 52 r.p.m.



ANOTHER JOB. Here Centerless Brushing finishes cast iron pistons to micro-smoothness. Simplifies assembly operations and increases life of pistons and cylinders. Output of this machine is 10,000 pieces per 8 hours.



TYPICAL PARTS which are being improved by Centerless Brushing include pistons, piston pins, bushings, tubing ... any cylindrical parts. It can be applied to many sizes of parts and types of material on a mass production basis.



**FOR DRILLING, CORE DRILLING,
ROUGH AND FINISHED BORING**

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work—or both.

Eliminates expensive tool construction—Reduces tool wear—Prevents seizure and pilot breakage—Especially adapted where precision is required.

Write for full information and prices

GATCO ROTARY BUSHING CO.

42330 ANN ARBOR ROAD, U.S. 12, PLYMOUTH, MICH.

Telephone PLYMOUTH 1472

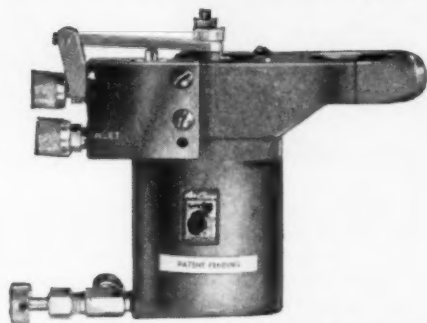
ing progress reports, and supervising and enforcing the budgets.

Such planning by budget sets up monthly or daily or weekly production estimates using stock-limit control of work in process, a simple quota system, or a "block" system such as is used in the tailoring industries. This makes it possible to plan and procedure kinds and quantities of parts and materials necessary for balanced production on the line, indicate sources of supply, schedule procurement, and plan deliv-

eries. It also makes it possible to keep raw materials and work in process inventories at a minimum in order to minimize the amount of capital that must be tied up in such fashion.

This factor of working capital required is often critical. Department stores, for example, "turn" their inventory in a year perhaps four times. Thus for a million dollars of gross sales they must at all times have \$250,000 tied up in merchandise. Manufacturing plants have a similar problem which is

DOUBLE YOUR DRILL PRESS OUTPUT FOR \$33



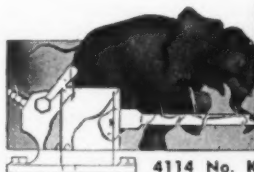
USE A NEW MEAD PNEUMATIC DRILL PRESS FEED

This simple, inexpensive device quickly converts standard drill presses into semi-automatic machines — increases production substantially on suitable jobs: double or more in some cases.

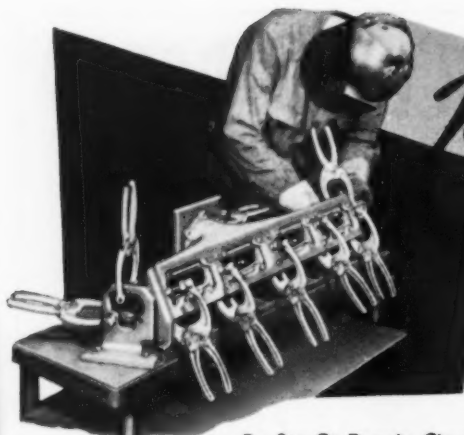
Clamps to spindle quill in a few seconds. Automatically closes air fixture on work. Adjustable feed control and break-through cushion. Quick return. Easy to synchronize with automatic cycle equipment.

*Air-Power does it quicker, cleaner, better.
Write today for latest complete catalog.*

for
**DRILLING
REAMING
TAPPING**



4114 No. Knox Ave., Dept. YA-92, Chicago 41, Ill.



Courtesy Steel Cooperage
Division of the Serrick Corp.

Versatile



Portable Clamps

Lick

Production Problem

The versatility of De-Sta-Co Toggle Clamps is demonstrated by this unique welding fixture designed by the Steel Cooperage Division of the Serrick Corp. The fixture holds four rectangular and three round manifold flanges to an alignment plate during the inert arc welding operation. "V" type prongs replace one jaw on three of the 12 Model #468 portable clamps to give additional gripping area. The quick, positive holding pressure of the clamps cuts set-up time to a minimum and permits precise alignment of the manifold flanges. Rapid toggle action, sure holding pressure, ease of work removal and rugged durability make De-Sta-Co portable clamps the logical choice for this production application.

There's a De-Sta-Co Toggle Clamp engineered for your work holding problems in assembly, welding, bonding, machining or inspection of any material. Select from over 40 fixture and portable models. Positive holding pressures up to 4000 pounds. Write today for a copy of the De-Sta-Co catalog describing available stationary and portable toggle clamps.



DETROIT STAMPING COMPANY

347 Midland Ave. • Detroit 3, Mich.

intensified where processes are long or complicated and where delays in production delay delivery and eventual collections from customers. Many plants have several times their investment in plant and equipment tied up in work in process at any given point—most of this investment springing from labor costs.

Routing and scheduling

Routing and scheduling functions answer the production control ques-

tions of where, how, who, how many, when. These are determinations of what machines or departments shall perform manufacturing operations in what sequence, and by what personnel. Based upon knowledge of machine capacities and worker performance standards, quantities may be scheduled for production by definite dates.

In high-production, repetitive operations, these functions are simplified because of the standardization of opera-

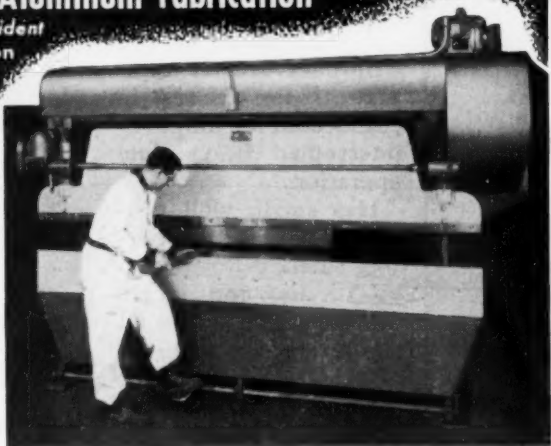
Cobell Supply Corporation Finds

Airtherm
**"METALWORKER"
POWER PRESS BRAKE**
Gives Satisfactory Service on Both Steel
and Aluminum Fabrication

H. A. NELSON, Vice-President
Cobell Supply Corporation
Fort Worth, Texas

**Get These 5 Time
and Money-Saving
Advantages**

1. **Built to Take It**—Rugged, welded, single unit construction permits you to operate at full capacity continuously.
2. **Get Started on the Job Fast**—Quick, easy set-up and adjustments means you get started with minimum loss of time.
3. **Save Production Time**—Fast operation combined with "stop on a dime" braking action keeps production flowing.
4. **Smooth Operation, Long Life**—Accurate machining, plus careful assembly and inspection assures a long life of top performance.
5. **A Really Versatile Machine**—Handles all kinds of bending, forming, and multiple punching jobs.



We can handle your requirements for standard dies. Send us your specifications; we'll give you recommendations.

Write for complete information on "Metal-worker" Press Brakes, models ranging in capacity from 18 gauge to $\frac{3}{8}$ " plate.

MACHINERY
DIVISION

Airtherm

MANUFACTURING COMPANY

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SERVING THE
METAL-WORKING
INDUSTRY
SINCE 1931

**4-WAY
SOLENOID
OPERATED
AIR-VALVE**

only
\$3250

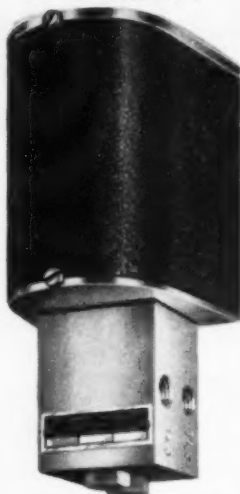
Compact sturdy construction, precision engineered for long, uninterrupted heavy duty operation.

Has small, well protected solenoid—operates small cylinders up to 3" dia. and larger cylinders where unusual speeds are not required.

Quantity and O.E.M. discounts. Write for description, discounts, etc.

IMMEDIATE DELIVERY

**For Fast
Operation of
Cylinders
up to
3" Diameter**



3-WAY VALVE

Same Design

only **\$1980**



AUTOMATIC VALVE CO.

37429 GRAND RIVER AVE., FARMINGTON, MICH.

tions, and the relatively simple nature of the production budget. With non-repetitive operations in the typical machine job shop, scheduling often consists simply of a clerk who has authority to set priorities for each department and determine from day to day which job goes where next.

In either case, necessary records must be kept of the status of work in process, so that progress reports can be meaningful to all who must make decisions to expedite and effect conservation of labor and materials.

Such progress reports may be converted to chart form, such as the Gantt chart, the Taylor planning board, or any of a number of common production control boards available today which show the location of each piece of work and its present condition.

Follow-up!

Dispatching, essentially a follow-up function, not only determines when and how work is to be done, but also provides means of follow-through to see that it gets done. This means that in

End Mills that Save Down-Time

Precision-made end mills that meet the highest standards of cutter design cut faster, more freely, and with less power. They turn out more work between sharpenings — reduce machine down time.

Brown & Sharpe End Mills are made under exacting quality control, from start to finish. Steel formula and heat treatment are closely held to rigid specifications. Careful machining maintains consistent adherence to design standards. Write for complete catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

WE URGE BUYING THROUGH THE DISTRIBUTOR



Extra-long,
fast spiral



Long,
two-flute,
fast spiral



Fast spiral,
double end



Ball end,
two-flute
fast spiral

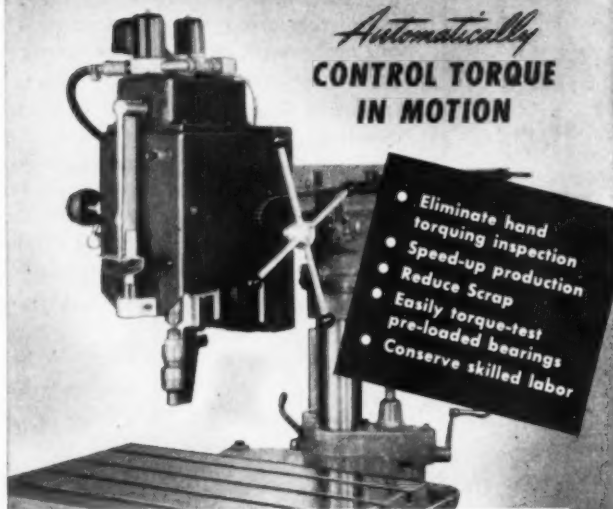


Brown & Sharpe



Power-Torque Tools

Automatically
**CONTROL TORQUE
IN MOTION**



- Eliminate hand torquing inspection
- Speed-up production
- Reduce Scrap
- Easily torque-test pre-loaded bearings
- Conserve skilled labor

● New Power-Torque Tools offer higher capacities . . . 0 to 2760 inch-lbs. Custom models in any desired torque range. All *measure torque in motion* at time of driving studs, nuts, screws to within 2% of pre-set torque limits. Write for complete illustrated specifications on Power-Torque Tools, Garvin Brothers, Inc., P.O. Box 536, South Bend, Ind., Dept. B-9.

POWER-TORQUE TOOLS
manufactured only by
GARVIN BROTHERS, INC.

most situations, dispatching is best done on a decentralized departmental level so that the people who are on the scene of difficulty and have the facts available also have authority to act.

Accurate and adequate records can make or break any dispatching operation. Records of machine capacities are necessary for assigning men and work to machines or making reassignments from time to time. Maintaining records of available tools, advance requisitioning of tools, and expediting their pro-

curement when necessary, are also part of the job. Keeping time records of when jobs are started and completed, checking inspection stations, keeping scrap and rework records, recording idle time of men and machines, and, above all, finding reasons for these conditions, are other elements of the dispatching function.

Integrate the operation!

It is easy for purposes of analysis to break down the production planning and control function, but it can never

Do You Want

STEEL PLATE SHAPES

WITHOUT COST
OF MACHINES?

•
WITHOUT
ADDITIONAL
MANPOWER?

*By-Products works directly from blueprints . . .
no patterns needed*

Save time, money and manpower on any job calling for steel plate components. For assurance of accuracy . . . for protection of your production schedules . . . turn your shearing, punching, pressing and other shaping needs over to *By-Products*.

No Patterns Needed

Equipped with 150 major machines, *By-Products* works directly from blueprints . . . uses your materials or our own. Parts come ready-made, suitable for quick finishing, quick assembly, *and you buy only what you use.*

Wide Range of Forming Facilities



Act now for prompt delivery on many sheared, blanked, pressed and punched parts. *By-Products* facilities include flame-cutting, bending and welding as well. Write today for details. *By-Products Steel Co.*, 516 Strode Avenue, Coatesville, Pa.

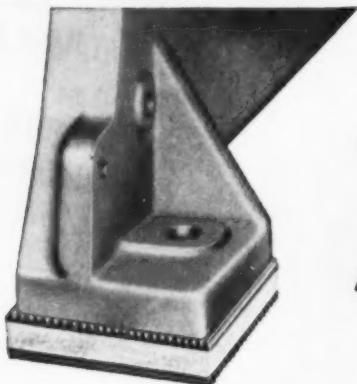
Plate that's shaped to save you money

BY-PRODUCTS STEEL CO.

A DIVISION OF LUKENS STEEL COMPANY

LUKENS

It's SIMPLE To Control VIBRATION and NOISE with Elasto-Rib...



NO BOLTING

NO CEMENTING

LOW COST

Elasto-Rib effectively stops transmission of vibration and noise by utilizing the elastic and damping properties of both cork and rubber.

It is fast and easy to install. For most machine applications, no bolts, lag screws or cement are required. Sheets 24" x 36" can be sawed or cut to size as needed.

New, illustrated booklet tells all about Elasto-Rib and how to install it. Ask for ER-701 and free sample.



be made to work in any such piece-meal fashion. The entire problem of production control is so complex, composed of so many closely interrelated factors, that the simple installation of, say, a new control board, or a new progress report form, cannot alone effect a substantial improvement in production control.

Changes and improvements in this function must be planned well in advance, done gradually so that all departments understand procedures and the reasons for them. And the entire

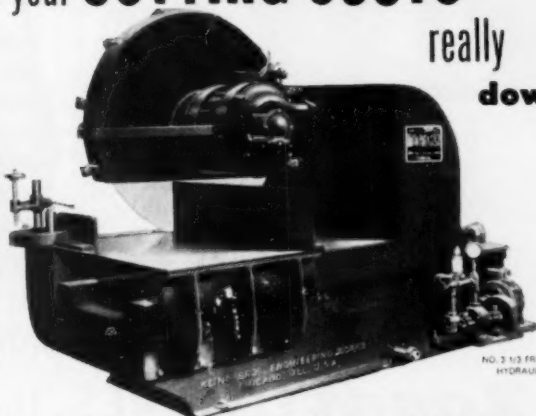
process must be coordinated from product design and sales forecast through budgeting, routing, scheduling, and dispatching to make possible profitable production with a minimum of wasted manpower and time.

Twenty ways to save manpower

1. Use a stock-limit control system to build parts banks and eliminate "emergency" production.
2. Set up signals on stock-limit control records—a maximum stock point,

are your **CUTTING COSTS**

really
down
far
enough



NO. 2 1/2 FRICTION SAW
HYDRAULIC FEED

you'll never know for certain until you COMPARE your PRESENT cutting speed with

the faster **Kling** ^{HIGH SPEED} **FRICTION SAW!**

What is friction sawing?

It is a proven means of using mechanical heat to cut steel. The weakened steel is removed by each succeeding section of the cooled saw blade—with no apparent wear on the blade.

Fastest, all-around cut-off machine in the shop.

No set-up changes required to cut any sequence of structural shapes. No distortion. One Kling Friction Saw will take the place of several separate shears or slow speed saws. Cuts alloy steels, too, in record time. Because blade life is measured in thousands of cuts, you eliminate downtime and save on tool costs.

Free friction sawing information. Write today for free booklet on Friction Sawing. Learn how you can profitably apply Friction Sawing in your plant.



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How long would it take you to cut these pieces?	Cut it with a Kling in ...
24" 100 lb. I Beam	28 seconds
15" 55 lb. Channel	15 seconds
8" x 8" x 34.3 lb. H Beam	10 seconds
100 lb. A.R.A. Rail	9 seconds
6 1/2" x 6 1/2" x 19.8 lb. Tee	5 seconds
8" x 8" x 1/4" Angle	11 seconds
3" Square	10 seconds
4" Round	15 seconds
6" O.D. Tube, 1/2" Wall	11 seconds

† Approximate Times

in our
60th
Year

Kling

...an investment in speed!



Combination Sheet
Punch & Copers



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Plate Bending Rolls



Zagar 2" holding fixture



Zagar 1" indexing fixture

Zagar 5-C pull type collet



Hold on, there!



there's
nothing
better
than a
good
watch-
dog

Depend upon
Zagar FIXTURES, too!

When all is said, this is the first, middle and last consideration — that fixtures, holding and indexing, must **HOLD**. On that score, Zagars have qualified famously for years — in simple and intricate machining operations. Accurate construction gives accurate performance. Zagar also has a complete line of air-operated holding fixtures and collet lathe chucks. Prompt deliveries **NOW!**



Write for Engineering Manual B-9 ➤

ZAGAR TOOL, INC., 24000 Lakeland Blvd., Cleveland 23, O.

Zagar

**TOOLS FOR INDUSTRY
and SPECIAL MACHINERY**

a point at which to order production and an "urgent" point.

3. Standardize daily production schedules per man, per machine, per department.

4. Anticipate sales with accurate forecasting to schedule out idle time.

5. Work within reasonable production standards—allow a margin of safety in scheduling based on known machine capacities and manhours required on production operations.

6. Decentralize scheduling—put it in the hands of the foreman who is on

the spot in his department and has all the facts at hand.

7. Route work through simplest sequence of operations.

8. Cycle machine work for subassembly and supply lines to balance production on main production line.

9. Keep paper work of dispatching and scheduling to a minimum consistent with having all necessary information in the right hands at the right time.

10. Make sure that records and reports give progress comparisons and

grinding and fitting

**DIFFICULT
CONTOURS**

is EASY with a

BOYAR-SCHULTZ

No. 1 Profile Grinder



A Bench model with Spindle speed of 20,000 R.P.M., Boyar-Schultz No. 1 Profile Grinder is a rapid Stock remover.

An ideal machine tool for grinding and fitting irregular inside and outside contours and profiles such as die clearances and other many grinding jobs that would otherwise require time consuming set-ups. A real time-saver, performing in minutes many jobs that formerly required hours.

Accommodates wheels $\frac{1}{8}$ " to 1" diameters.



**Boyar-Schultz
No. 2 Profile Grinder**

For grinding and fitting large dies and punches such as forming dies for refrigerators, tables, sanitary ware and other large work. Spindles turn at 10,000 R.P.M. Accommodates wheels $\frac{1}{4}$ " to 3" diameters.

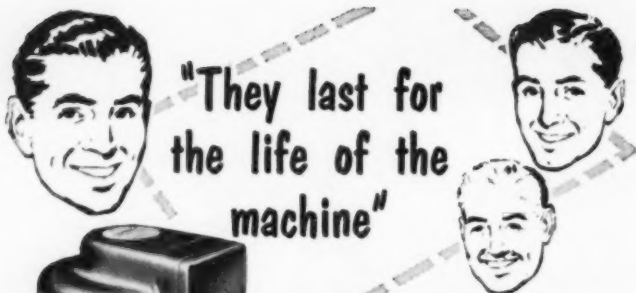


BOYAR-SCHULTZ CORPORATION

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Chicago 12, Illinois



"They last for
the life of the
machine"



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Ask any machine-tool manufacturer who uses Ruthman Gusher Pumps on their machines, they'll tell you that Gusher Pumps are efficient, dependable, and remarkably trouble-free . . . a credit to the metal working machines on which they are installed. So specify Ruthman Gusher Pumps on all your metal working equipment.

THE RUTHMAN MACHINERY CO.

1816 READING ROAD

CINCINNATI, OHIO



other data necessary for decisions and immediate action.

11. Train foremen so they understand that quality, quantity, service, and costs are inter-related, and a "balance" must be maintained.

12. Establish specific quality standards with economical systems for inspection and standard-maintenance. Train workers to know what IS quality—not just "good" but specifically HOW GOOD.

13. Establish minimum and maximum standards of service including delivery, complaints, adjustments, repairs etc.

14. Coordinate design of product with materials to be used and manpower and facilities available to make most economic use of manpower.

15. Anticipate changes in scheduling far enough in advance to allow time for change-overs, hiring a second shift, planning orderly lay-offs, or other fac-

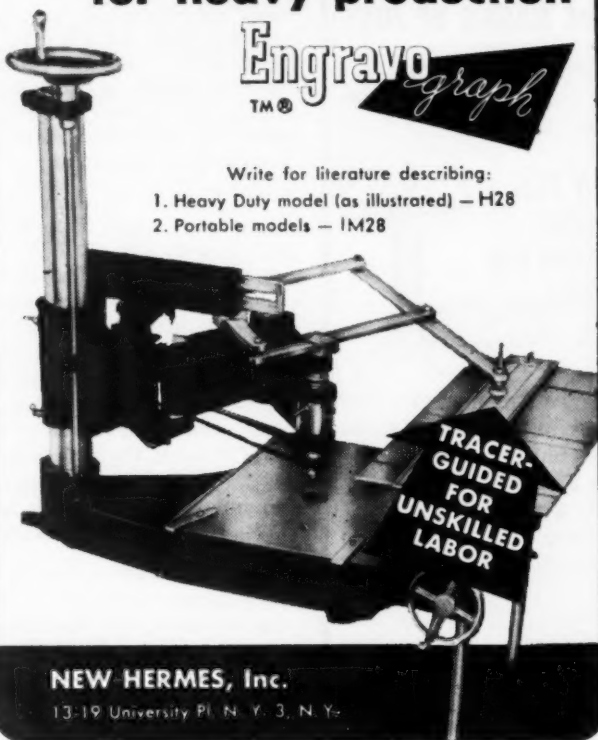
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Write for literature describing:

1. Heavy Duty model (as illustrated) — H28
2. Portable models — IM28



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13-19 University Pl. N. Y. 3, N. Y.

tors which otherwise would increase costs.

16. Maintain communications within the plant, between departments and between work stations so that bottlenecks, tie-ups, and other difficulties can be handled quickly without disturbance.

17. Set up priority rating system for handling job-shop orders to avoid every job being a "rush" order.

18. Clear all production authorizations through a central office or single authority who has final responsibility

for making changes in plans and schedules.

19. Keep employees informed as to the "why's" of production schedules. A simple and correct explanation avoids both misunderstanding and resistance to orders given.

20. Provide for adequate and effective follow up on all jobs at supervisory level on departmental activities, and on staff level against orders in process on their way through various operations or departments.

FLEXIBILITY

FOR A WIDE RANGE OF JOBS

THE JOHNSON 706 HARDENING, TEMPERING and ANNEALING FURNACE



Select any temperature you require from 300° to 1875° F. Get clean, uniform heat at low cost. The Johnson 706 is easily regulated. Six direct jet burners have separate valves and pilot lights. Firebox 7 x 13 x 16½ lined with high temperature refractory. Counterbalanced door opens upwards.

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No. 706 Bench	\$250.00
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Pedestal	\$150.00
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JOHNSON
FURNACES FOR INDUSTRY

Radioactive cutting tools for rapid tool life testing

By M. Eugene Merchant, assistant director of research, Hans Ernst, director of research and E. J. Krabacher, research engineer, The Cincinnati Milling Machine Co.

ONE OF the newest and from all indications one of the most accurate methods for measuring cutting tool wear is that which uses a tool rendered radioactive by neutron irradiation; the resulting chips are collected and their radioactivity measured.

M. Eugene Merchant, assistant director of research, Hans Ernst, director of research and E. J. Krabacher, research engineer, of The Cincinnati Milling Machine Co., Cincinnati, Ohio, were the men who carried out experiments that established the fact that tool materials would, upon irradiation, furnish suitable radioisotopes for use in such tool wear studies. The service irradiation of the tools was carried out by the Oak Ridge National Laboratory on authorization from the Isotopes Div., U. S. Atomic Energy Commission.

Health problems were a factor, but with proper precautions—light shielding, tweezers, tool holders with extensions, lead and steel chambers for storing, monitoring etc.—danger was kept to a minimum.

The rate of wear of a cutting tool, when machining under normal conditions, is so low that, to measure it by ordinary means, as by use of a microscope, requires observation over a long period of time, of the same order of magnitude as the life of the tool.

Some extraordinarily sensitive means

This is an abstract of a paper delivered at the semi-annual meeting of the A.S.M.E., Cincinnati, June 15-19, 1952.

This DELTA 14-inch Drill Press

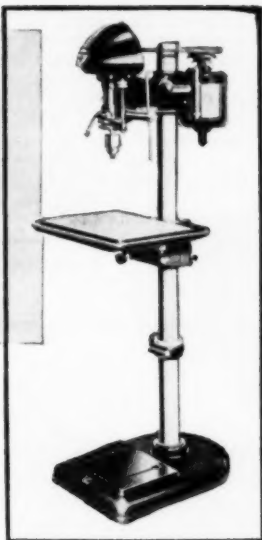
IS SCORES OF
MAINTENANCE TOOLS
IN ONE

Here's a machine that pays for itself very quickly by doing a wide variety of woodworking operations, in addition to drilling. You can do sanding, routing, shaping, mortising, tapping and many others. Ideal for metalworking, too—capacity is $\frac{3}{8}$ " in steel, $\frac{1}{2}$ " in cast iron.

With the exclusive Delta interchangeable spindle, the cutting tool can be changed in seconds.

The Delta 14" drill press is easily portable—bring the tool to the job or the job to the tool.

Send for the Delta AB-51 Catalog with full specifications covering all Delta drill presses.



There's a Delta Power Tool for Your Job—Wood or Metal Working
53 MACHINES — 246 MODELS — MORE THAN 1300 ACCESSORIES



DELTA POWER TOOL DIVISION
Rockwell MANUFACTURING COMPANY
610-K N. LEXINGTON AVE., PITTSBURGH 8, PA.

of measuring wear had to be found before a very rapid tool life testing method could be possible. By using the radioactive cutters, it was found then, that if alternate cuts were made, for example, with two cutting fluids, the relative rate of tool wear with the two cutting fluids could be measured and thus the relative tool life predicted. Any effect of a gradual change in slope of the general curve could be eliminated

by averaging the results of a few alternate runs. The fact that the actual curve was later found to be essentially linear was a further advantage, though not a necessity for success of the method.

Each individual tool life determination requires only from 6 to 30 seconds cutting time. This allows several hundred tests to be made with each tool tip.

TYPICAL RELATIVE TOOL LIFE EVALUATION - TWO CUTTING FLUIDS

Workpiece: S. A. E. 8650 steel (tubular)

Width of cut: 0.2000 in.

Feed per revolution: 0.0036

Cutting Speed: 591 fpm

Tool: Sintered Carbide (78) 0° rake 7° relief

	CUTTING FLUID	
	"A"	"B"
Counts per minute net above background, per gram of chips, due to tool wear products	3.65	3.71
	3.54	3.12
	3.49	2.80
	3.40	3.26
	3.50	2.88
	3.79	2.94
	3.34	3.50
	3.55	2.88
	3.23	3.23
Average	3.50 ± 0.10	3.15 ± 0.21
Uncertainty	± 2.9%	± 6.7%
Relative Tool Life	100%	111%

For wear rate measurements the chips are placed in a Marinelli beaker for counting. This type of beaker contains a central cylinder into which the Geiger tube may be inserted for gamma counting without coming in contact with the chips. The automatic scaling circuit may be set to count for a predetermined number of counts before it shuts off. The number of predetermined counts

chosen is determined by the desired counting accuracy. The normal time required for counting to a $\pm 2\frac{1}{2}\%$ accuracy is from two to four minutes. The total counts are divided by the counting time to give counts per minute (gross). The background counts per minute are subtracted from this value to give counts per minute (net). This value, in turn, is divided by the weight of chips

Cushioned POWER



C/R JAW-HEAD

FACES REPLACED IN SECONDS

Merely loosening
a nut releases
jaws for replacing
faces. Tightening
nut holds faces
in vise-like grip.



The best "soft" striking tool
you can buy. Tough, resilient
water buffalo faces deliver
needed power, cushioned to pro-
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parts. Faces quickly and
easily replaced. Safety-Flare
handle gives comfortable, non-
slip grip. When you need a
"soft" hammer, make sure it's
a C/R Rawhide Jaw-Head.

For further information write Dept. 22

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suppliers. Also C/R
Rawhide mallets
and Rawhide mauls.

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In Canada: Super Oil Seal Mfg. Co., Ltd., Hamilton, Ontario

TYPICAL RELATIVE TOOL LIFE EVALUATION - THREE WORK MATERIALS

Workpiece: A.I.S.I. 3145, A.I.S.I. 8650 and A.I.S.I. 80B-45 steel (tubular)			
Width of cut: 0.200 in.		Cutting Fluid: Water Soluble (1:20)	
Feed per revolution: 0.0035		Tool: Sintered Carbide (78B)	
Cutting speed: 145 fpm		+ 10° rake, 7° relief	
MATERIAL	A.I.S.I. 3145	A.I.S.I. 8650	A.I.S.I. 80B-45
Counts per minute net above background, per gram of chips, due to tool wear products.	16.7	17.6	20.8
	17.3	17.9	20.8
	15.5	18.7	16.8
	15.9	16.9	17.2
	15.0	19.3	18.5
	16.0	18.8	18.4
	18.1	13.4	14.9
	18.1	17.6	20.8
Average	16.58 ± .91	17.53 ± 1.5	18.53 ± 1.8
Uncertainty	± 5%	± 8%	± 10%
Relative tool life	100%	94%	89%

in grams to give the final value of counts per minute per gram of chips (cpm/gm.) which is a direct measure of the rate of tool wear.

The results of a series of cuts taken on AISI 8650 steel, starting with a sharp tool, are shown in Figure 1; here the total radioactivity of the chips (which is proportional to the amount of radioactive tool material present on the chips), as accumulated throughout the series of cuts, is plotted against tool wear as measured on the flank of the tool with a microscope in the conventional way.

It can be seen that the measured radioactivity correlates with the wear measurements made with a microscope (figure 1). The cascading effect, seen in the picture, is a well known factor which often prevents the obtaining of reliable measurements of the rate of tool wear from short time tests, covering only a small portion of the wear curve when using conventional methods.

It is evident that an accurate measure of the rate of tool wear can be obtained by averaging the values for the activity of the chips (cpm/gm. of chips) obtained from only a few runs



"SLASH"

YOUR SET-UP TIME

WITH THE

TREE

TAPER BORING TOOL

Cut expensive set-up time from hours to a few minutes with the revolutionary TREE taper boring tool. You can use it on your present milling machine, jig borer or boring bar. Write today for complete information. In addition to boring taper holes this tool can be used for—



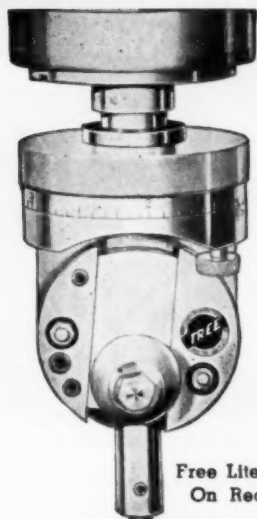
- Straight boring . . . as shown at left used as offset boring tool.



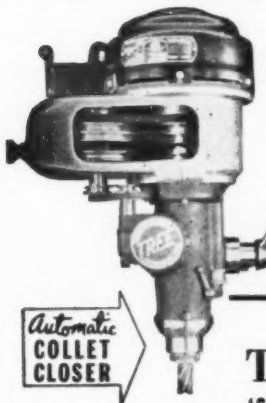
- Facing . . . up to 10" in diameter.



- Outside Turning . . . either straight or tapered up to 8" with extension bar.



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TREE UNIVERSAL MILLING HEAD ATTACHMENT . . .

All Angle Milling, Drilling & Boring.
Compact Design, $\frac{3}{4}$ " Collet Capacity.
4" Quill Travel. Power Feed Eight Speeds—
140-3500 RPM or 210-5200 R.P.M. Hardened
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Balancing Tools for a Wide Range of Work



Here's a complete line of Balancing Tools which will save their cost quickly on balancing or truing operations. Accurately sensitive and durable, they provide a simple, reliable means for checking the balance of parts like gears, shafts, fly wheels, pulleys, etc. The standard sizes available are shown in capacity chart below.

CAPACITIES

Swing	Between Standards	Weight Capacity
21 in.	20 in.	12 lbs.
21 in.	20 in.	800 lbs.
43 in.	29 in.	800 lbs.
43 in.	29 in.	2,000 lbs.
6 ft.	5 ft.	5,000 lbs.
8 ft.	8 ft.	10,000 lbs.
Any	Any	24,000 lbs.
43 in.	30 in.	800 lbs.

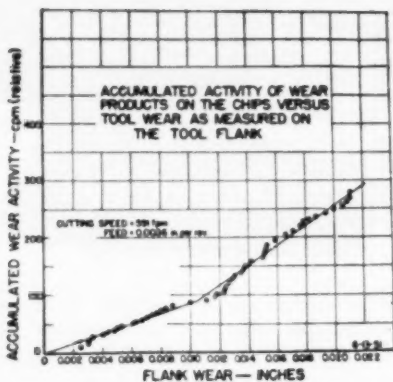
FREE DATA

You can obtain complete information on Sundstrand Balancing Tools by writing for bulletin 424

SUNDSTRAND



SUNDSTRAND MACHINE TOOL CO.
2535 Eleventh Street, Rockford, Ill., U.S.A.



1 The observed wear on the flank of a cutting tool, as measured by a microscope, is plotted as a function of time.

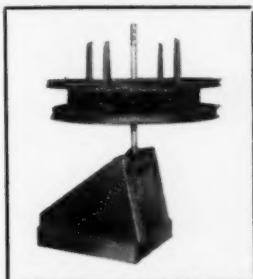
of a few seconds duration each. The total wear products that remain with the chips as compared to the amount that accumulate in the cutting fluid were negligible and found to be not worth considering.



MOSLO "SHIFTWEIGHT" COUNTER-BALANCED WIRE REELS

Takes the Manual Labor out of loading a Reel with Wire. Just unlock the knurled spindle by a twist of the wrist, tilt the reel assembly 90°, roll coil of wire to reel, lift 6" on to centering arms, release lock by twist of wrist, use spindle as lever to lift, and the **Weighted Counterbalance** does the rest!

Capacity 300 lbs. — Min. Coil I.D. 10" — Max. O.D. — 41" All welded steel construction — Brake Equipped.



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NEW IMPROVED HAND SCRAPERS with just the correct spring

and other features
never before incorporated
in any hand scraper

FASTER CUTTING



EASIER TO USE

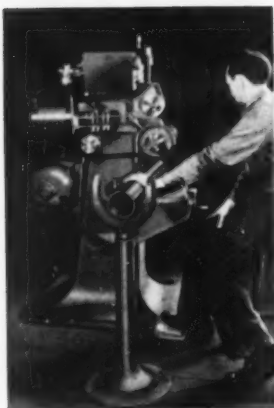
This new Hand Scraper, Model No. 5, is the most improved tool of its kind ever produced. Light in weight, easier to use with palm fitting comfort grip, faster cutting.
Rubber handle swivel pad, at small

extra cost, for those who place scraper handle against body for extra leverage. Three sizes: 18"—20"—22" long. Furnished with high speed steel or Carbide Blades. Cost less than home made scrapers.



Write for Bulletin No. 9-5
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*Balancing Ways, Roto Checkers, Hand and Power Scrapers,
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Catalog 46



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CHICAGO 8, ILL.

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more ACCURATE cuts

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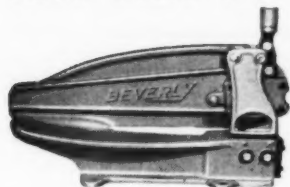
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Save Time . . . Labor . . . Materials with



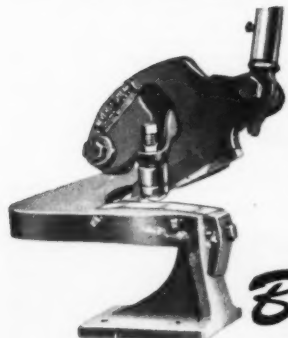
Inside SLOTTER

Makes cuts up to 8" inside edge of sheet. Sharp, clean burr-free cuts always assured. Cap. 16 ga. High strength aluminum alloy body; H.C.H.C. blades.

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Throatless SHEAR

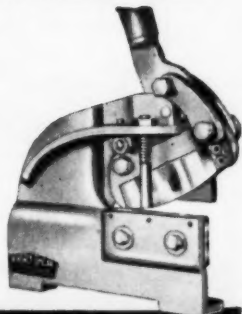
Make any cut—straight, irregular, curved. Exclusive design permits turning work any direction while cutting. 4 models—cap. to 3/16".



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New "SS" Series—easier cutting with compounded linkage. 3 models—cap. to 3/16"; trimming capacity to 5/16" mild.

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Ames Dial Comparators make the inspection of duplicate parts an extremely simple, rapid and accurate operation. Ames Comparators are strictly impersonal in their accuracy—the results being in no way dependent on the skill or judgment of the operator. The pressure of the gauging members against the work is mechanically determined and therefore uniform.

Check the Ames Dial Comparators shown—one of them may solve a Quality Control problem for you.



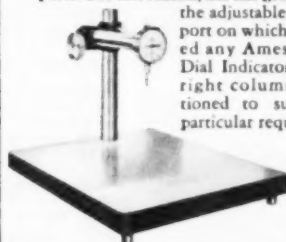
Ames No. 1 Dial Comparator is an easily adjustable bench model that measures objects up to 2" in cross section. The table bracket may be quickly located and locked in position on the column. The table itself may be further positioned and locked for final fine adjustment. This comparator is designated *Ames No. 1W* when equipped with dead-weight contact pressure and contact area to ASTM specifications for measuring resilient materials.



Ames No. 2 Dial Comparator is a compact, stable bench model for measuring non-yielding materials—sheet metal, glass, hard rubber. The 2" diameter table is adjustable to bring pointer to zero. *Ames No. 2W* is similar to the Ames No. 2, but is furnished with dead-weight contact pressure and contact areas to ASTM specifications for checking textiles, plastics, sheet rubber, etc.



Ames No. 13 Dial Comparator features flat-ground, cast-iron base of ample size for using V-blocks and locating fixtures for checking rounds, flats and odd shapes. Also, the No. 13 can be fitted with a fine adjustment for close setting. Accurately adjustable bracket holds any Ames Micrometer Dial Indicator.



Ames No. 130 Dial Comparator is designed especially for inspecting comparatively large parts. For this reason, the flat-ground steel base, the adjustable indicator support on which can be mounted any Ames Micrometer Dial Indicator, and the upright column are proportioned to suit the user's particular requirements.

Send us your Quality Control job specifications, and we will supply complete details and proposal without obligation.

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Mfrs. of Micrometer Dial Gauges • Micrometer Dial Indicators

**A special report
by the editors of
MACHINE and TOOL
BLUE BOOK**

Report number 23

Drilling machines.. part 4

This is the twenty-third in a monthly series of special reports discussing various types of machine tools. Included in this month's special report on drilling machines are:

1. Drilling brass, bronze, copper; cast iron; monel metal; zinc alloy die castings; sheet metal.
2. Descriptions of late model drilling machines.
3. Specifications of American-built machines.

Previously published reports discussed: 1. Thread Rolling; 2. Power Press Brakes; 3, 4, 5. Milling machines; 6. Honing, Lapping, and Superfinishing; 7. Automatic Screw machines; 8. MAPI Replacement Formula; 9, 10. Chucking machines, Turret Lathes, Hand Screw machines; 11. Broaching machines; 12. Shapers, Slotters, Keyseaters; 13, 14, 15. Lathes; 16. Planers; 17. Gear making machines; 18, 19. Boring machines; 20. Drilling machines, parts 1, 2, 3.

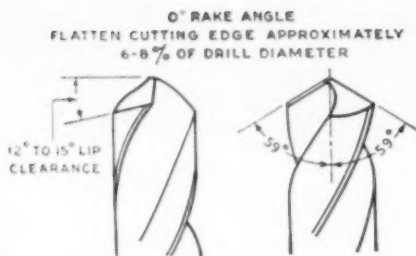
Drilling brass, bronze, copper; cast iron; monel metal; zinc alloy die castings; sheet metal.

Drilling brass, bronze, copper

Modern metallurgy has developed, in recent years, a series of copper, brass, and bronze alloys by the addition of one or more closely controlled elements, making them more serviceable and with degrees of machinability extending from free-cutting yellow brass all the way to copper and the tough bronzes.

Roughly, copper alloys fall into three groups: (1) **The free cutting alloys**, usually brasses, to which a small percentage of lead has been added. This includes alloys with a machinability

rating of 70 to 100 (free-cutting yellow brass is 100). When these alloys are machined, short brittle chips are produced; (2) **readily machinable alloys** with a machinability rating of 30 or more, but less than 70, including the group of non-leaded brasses from Muntz metal, or naval brass with 60% copper to red brass with 85% copper content. This group also includes leaded phosphor bronze, leaded copper-silicon alloy, and leaded nickle silver with a nickle content of from 12% to 18%; (3) **Tough alloys with a machinability rating of 20**. This group includes non-leaded coppers,

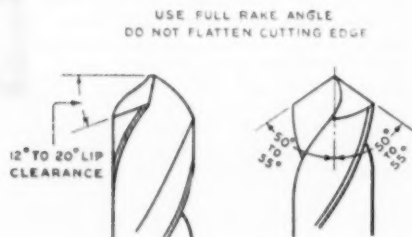


1. A standard high speed steel drill modified in this manner is suitable for tough, stringy metals of the non-leaded coppers, nickel silvers, phosphor bronzes and super nickel.

nickel silvers, phosphor bronzes and super nickel. These alloys usually produce long, tough, stringy turnings.

Where volume of production does not warrant the use of special drills, standard carbon or high speed steel drills with clearance and point angles given at the factory are often satisfactory for use on the first and second groups. If a drill is sharpened as shown in figure 1, it works well in the third group. Figure 2 shows a standard drill for use in groups one and two. The helix angle of a stand-

2. For the free cutting alloys and readily machinable ones like Muntz metal, naval brass, red brass, leaded phosphor bronze, leaded copper-silicon and leaded nickel silver, this type standard is satisfactory. Flattening the cutting edges will prevent "hogging in."



ard twist drill is approximately 26° to 30° , but varies somewhat depending on the manufacturer and the diameter of the drill. Flattening the cutting edges as suggested will overcome "hogging in" at the breakthrough.

High speed steel drills of special design are frequently used in regular production work. The natural zero degree rake angle in flat and straight, figure 3, flute drills, are widely accepted for groups 1 and 2, especially in screw machine work. The slow spiral or "brass" drill, figure 4, with a decreased helix angle ranging from 10° to 22° , and with wide, polished flutes and a thin web, provides large chip clearance with a decreased rake angle. It is often used for screw machine work, deep hole drilling and other fast drilling operations on the alloys in the first two groups.

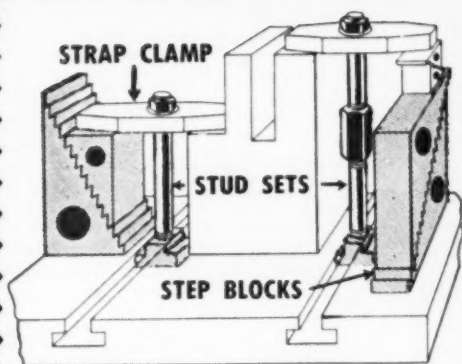
For copper and those in group three that produce tough, stringy chips, high spiral drills, figure 5, having a helix angle of around 40° are being used widely. Particularly in deep drilling, the greater number of twists per inch provide the increased rake angle and help to eject chips. Flat, straight flute, standard twist, "brass" and high spiral drills may all be sharpened with the lip clearance and point angle suggested for the various alloys.

All alloys of copper are often worked dry, but can sometimes be drilled to better advantage when a suitable lubricant is used, particularly for deep holes or when accuracy is needed. Group three should always have a lubricant, if possible.

Feeds will exceed those normally used for mild steel. When working the groups that work harden easily, such as annealed aluminum bronze, it is necessary to keep the drill cutting continuously to prevent glazing. On deep holes it may be necessary to back off occasionally for chip clearance.

Since many factors influence the speed and feed, it is difficult to set hard and fast rules. However, depending on drill size, thickness of the work and depth of hole, a speed of 200 to 500 or more feet per minute is frequently used

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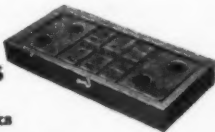
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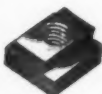
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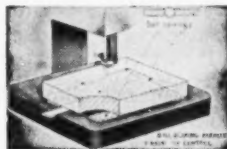
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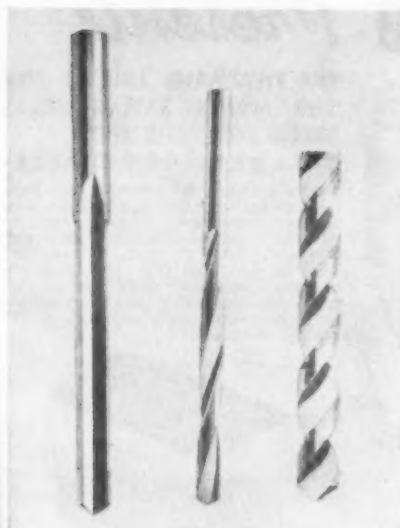
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for the group one alloys. For two, a 75 to 250 feet per minute isn't too fast and for group three 50 to 125 is all right when using a lubricant.

For drill sizes 1/8" to 3/4", in all three groups, feeds per revolution range from .003" to .020", the lighter feeds being used for the lighter drills, the deep holes and where accuracy is maintained. When using carbon steel drills, the speeds should be reduced by approximately 50%.

For the free cutting alloys in group one a light mineral oil, frequently called paraffin oil, is used in large quantities on automatic and hand screw machines and directed at the cutting edge of the tools. An inexpensive cutting compound such as 20 parts water to one part soluble oil is satisfactory also. This can be used for group two, but a mixture more likely to prove satisfactory, as both lubricant and cooler, would be a mineral oil base, fortified with five to 15 percent lard oil, a higher percentage of lard oil being used on those with tough, stringy chips.

Ten to 20 percent lard oil in a mineral oil base is used frequently for those alloys in the third group. For copper

3 (Left). High speed drills of special design are frequently used in regular production work. The natural zero degree rake angle in flat and straight flute drills is widely accepted for alloy groups 1 and 2 (see beginning of article), especially in screw machine work. This is a straight fluted drill.

4 (Center). The slow spiral or "brass" drill, Fig. 4, with a decreased helix angle ranging from 10° to 22°, and with wide polished flutes and a thin web, provides large chip clearance with a decreased rake angle and is often used in screw machines for alloys in the first two alloy groups (see beginning of article).

5 (Right). For copper and those alloys in group three that produce tough, stringy chips, high spiral drills like the one above, having a helix angle of around 40°, are being used widely.

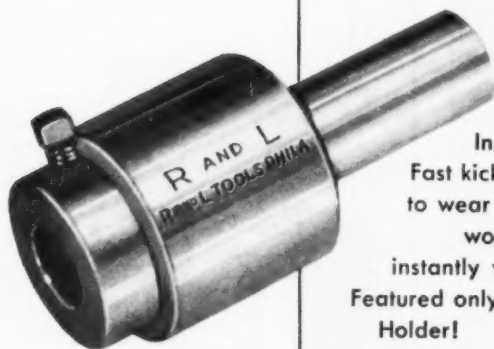
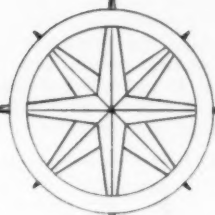
and those with a high nickel content, sulphurized mineral oil or sulphurized mineral-lard-oil compounds have given excellent results. When a sulphurized compound is used on copper alloys, the parts should be cleaned as soon as possible after machining to avoid discoloration. However, such tarnish disappears after a 20 minute immersion in a 10% sodium cyanide solution.

Drilling cast iron

Laboratory tests and production applications seem to indicate that carbide-tipped twist drills have much to offer in speed and lasting service in drilling cast iron.

A carbide-tipped drill is made by simply inserting a standard carbide twist drill tip in the end of a conventional high speed steel twist drill, figure 6. Precautions to be taken regarding machine and fixtures do not differ from accepted practice for high speed steel drilling. Foremost in consideration would be that enough power should be available to take care of the increased rate of chip removal provided by the carbide.

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Very satisfactory results have been reported by one of the leading twist drill manufacturers by brazing the tips to the end of regular high speed steel twist drill bodies as one of their regular manufacturing operations. The 118° point angle, ordinarily found, is ground on the end of the drill at a 12° lip relief, figure 6, using a 180-grit resinoid bond diamond cup wheel. It is advisable to first remove the excess steel and carbide with a silicon carbide wheel by grinding a 14° clearance angle up to a $1/32''$ wide land as shown at right in figure 6. An 8° right hand spiral for the flutes through the drill body gives a free movement of chips out of the hole.

On conventional equipment, practically any speed in the range of 75 to 200 s.f.p.m. gives good results. Drill feeds between .008 and .013 per revolution have resulted in good operating conditions on quite a variety of jobs. It has been said that it is better to increase feed rather than speed at first.

Practically all drilling of cast iron has been done dry or by air jet. Where coolant is a must, a soluble oil solution is satisfactory. However, the shock from coolant hitting hot carbide as it is pulled from the hole may lessen the life of the drill. A valve arrangement to shut off the coolant before the drill is withdrawn would solve this.

Such materials as ordinary cast brass and bronze can also be drilled with carbide-tipped twist drills at the higher cutting speeds and feeds.

These carbide twist drills have not as yet proved satisfactory in drilling of steel and are not recommended for that purpose. For such materials, modified gun drill styles such as the "all depth" type of drill are preferable. For holes above 1-3/4", or thereabouts, carbide trepanning tools offer many possibilities for faster drilling of steel.

The machinability of alloyed gray iron castings is not readily measurable; the composition, structure and physical properties vary over a wide range. While Brinell hardness is an indication of the structure within the same hardness range, the machinability varies inversely proportional to the tensile strength and changes in structure

caused by alloying. In irons 175 to 250 Brinell, machining is made possible by an alloy composition which produces a matrix in which no massive carbides exist.

Drilling of monel metal

Monel metal is an alloy of nickel and copper, containing about 68% nickel, 30% copper and 2% of other materials, principally iron. It is not a hard material, but very tough. For that reason moderate feeds and speeds are necessary. Surface speeds of from 45 to 65 feet should be used, depending on the machining conditions and depths of cuts. Feeds comparable with those used for cutting alloy steels are suitable for this material.

Use the standard type of twist drill (without cutting edge flattened). Speeds are 40 to 60 feet. Feeds are .006 for 1/4" drill, .010 for 1/2" drill, .013 for 1" drill; other diameters of drills in proportion.





Tips on Better DRILLING

POINTS TO LOOK FOR IN CHOOSING A DRILL —



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No. 21 DRILL

Above is an example of a good all-around job drill with capacity up to $1\frac{1}{2}$ " in cast iron. It's easy to handle, easy to adjust, accurate and rugged. It has direct or back-gear drive; both hand and lever feeds. BULLETIN 3746 gives complete details—WRITE FOR YOUR COPY. "Buffalo" also builds a complete line, including 8 other types in all desired ar-

rangements—complete information on request. Remember, check the key points of a drill before you buy—spindle, controls, adjustments, working space, column and all other specifications available. It pays to get the best construction always—especially, in these days when every machine tool counts so strongly!



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BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

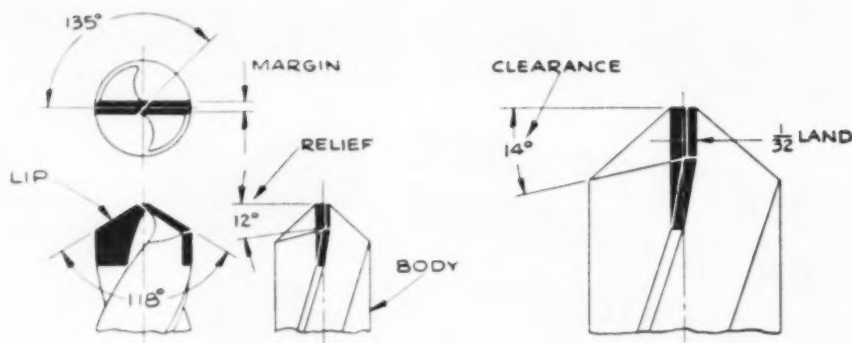
DRILLING

PUNCHING

SHEARING

CUTTING

BENDING



6. Some drill manufacturers braze the end of regular high speed drills with carbide tips. The conventional 118° point angle is ground on the end of the drill at a 12° lip relief angle, shown above, by using a 180-grit resinoid bond diamond cup wheel. It is advisable to first remove both the excess steel and carbide with a silicon carbide wheel by grinding a 14° clearance angle up to a 1/32" wide land as noted in right figure. Longest drill life is obtained when the cutting edges along the drill lip are smooth and keen and without blemishes. Length of lips, of course, should be identical. For chip flow, flutes should be polished.

For deep holes a polished flute and somewhat heavier web is advisable. Ample back taper should be provided, because this material picks up easily on the margin of the drill. Use regular point angle and lip clearance. Do not attempt to use drill after it begins to dull.

For coolant, a good mixture of soluble oil or its equivalent gives excellent results.

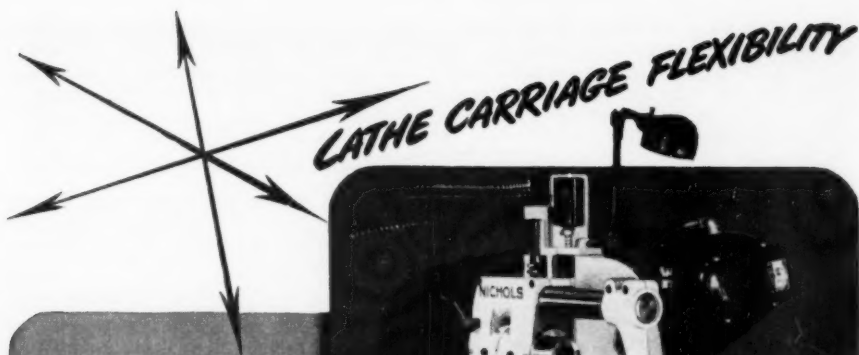
Drilling of zinc alloy die castings

Although die castings are often made to such exact specifications that little machining is necessary, drilling, reaming, milling or tapping must be performed.

High speed steel drills are, as a rule,

7. This is a special drill for work in cast iron—four fluted, 4 1/2".





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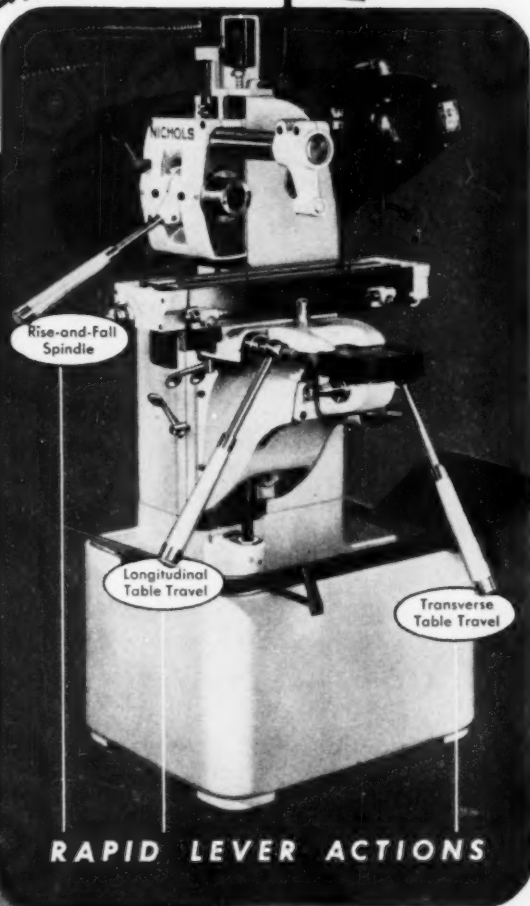
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Table Working Surface	6 1/2" x 21"
Longitudinal Table Travel	10"
Transverse Table Travel	2"
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Rise and Fall of Spindle	4 1/4"
Selective Speed Ranges up to	5000 R.P.M.
Weight	1250 lbs.

very satisfactory for these alloys. Keen, smooth edges must be maintained at all times in order to obtain satisfactory finishes and to hold specified tolerances. Drills should be resharpened often before becoming too dull.

Drills of the fast spiral type, figure 5, seem to work most satisfactorily. This is especially true of deep holes. In order to eject chips freely, polished flutes are recommended. Clearance of point at periphery should be 15° to 18° .

If a cutting fluid is required, kerosene seems to perform most efficiently. If used, however, the parts must be thoroughly cleaned before plating.

Speeds up to, and in excess of, those used for soft brass (300 s.f.m.), may be used. Some experimental work may be necessary as variations in machin-

ability are found, especially if the alloy mixtures vary. Feeds, as a rule, are limited only by the finish desired and the ability of the tools to eject the chips.

Drilling sheet metal

Special problems because of break through, etc., when drilling sheet metal, and other thin sections, call for special remedial action.

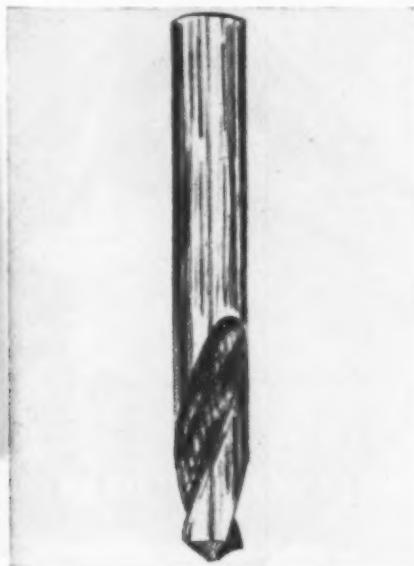
Breakage is generally high. This is due to several factors. Since drilling is often done with a hand supported power tool, pneumatic or electric, the drill is not rigid in line of feed and the feeding pressure is not constant. There is no support when the drill breaks through; therefore, producing a distinct shock. In some cases the metal is deformed before the drill begins cutting. When it does begin cutting the full torque is forced on the drill instead of starting in gradually. Sometimes, with certain metals, work hardening is more pronounced on thin sections.

Usually the answer is the use of the proper drill. Generally the ordinary drill isn't satisfactory. A shorter drill with heavier flutes, figure 8, often helps. Heavier web construction is an aid. Regular drills are made to drill deeper holes, so they need longer flutes. Chip space is unimportant in drilling sheet metals and similar material, consequently the flutes can be very short, and the cross section can be kept quite heavy throughout. Ordinarily the web should be standard or less to help keep down the end thrust.

If special drills cannot be had, standard drills may be resharpened after cutting off about a third of the flute, making it sturdy enough to keep breakage down.

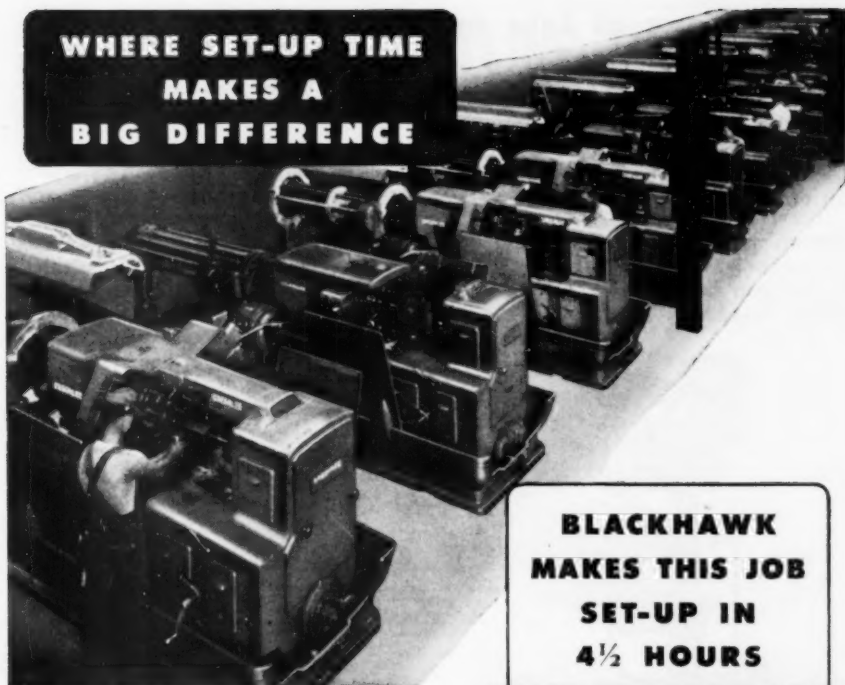
References:

- The American Brass Co., Waterbury 20, Conn.
- Carboloy, Dept. of General Electric Co.
- National Twist Drill & Tool Co., Rochester, Mich.



8. This stub type drill, designed primarily for close-to-work screw machine operations, gives very good service in portable drills, especially when drilling thin sections, because of less breakage due to its shorter length.

**WHERE SET-UP TIME
MAKES A
BIG DIFFERENCE**



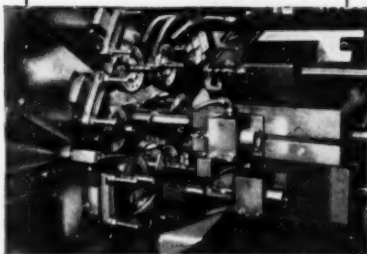
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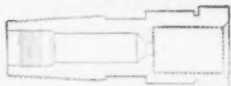
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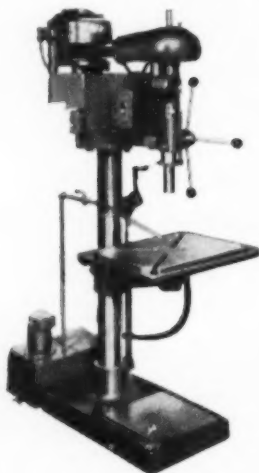
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Descriptions of late model drilling machines

Sibley Model E-25

Built by the Sibley Machine & Foundry Corp., 206 E. Tutt St., South Bend 23, Ind., these machines come in capacities of 20", 24", 25", and 28" swing.

Shown is the Model E-25, a new medium-weight drilling machine, filling the gap between the "too light" and the "too heavy" classes. As a new



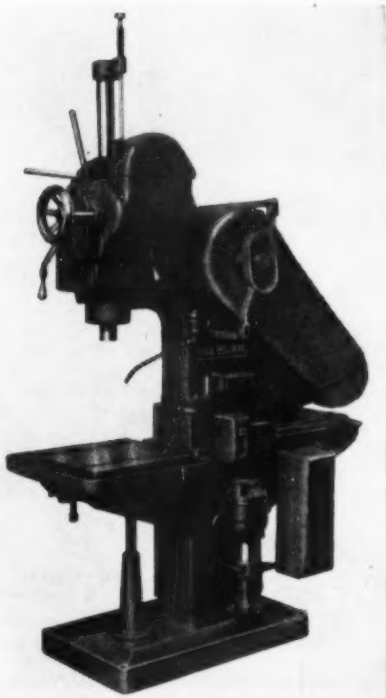
concept, its 25" swing is a unique feature. It has a variable speed drive from which the exact speed may be obtained for any size drill from $\frac{1}{8}$ " to 1". The extra large table with coolant trough permits handling a variety of work not possible with some other types.

A sensitive drilling machine, it is suited for high speed production, as well as varied requirements of maintenance work. The tachometer shows the operator the exact spindle speed at which the machine is operating. It is powered with a modern Fairbanks Morse $1\frac{1}{2}$ h.p. axial gap motor.

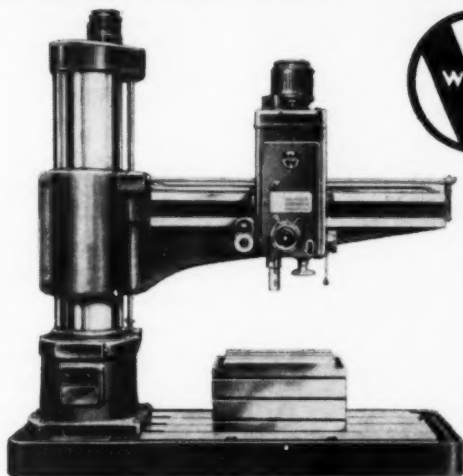
Colburn heavy duty manufacturing type drill presses

The power attributed to these machines is due to features such as: heavy box-type heads; rigid column and table; stub tooth chrome-nickel steel drive gears, heat treated and running in oil; short driving shafts of large diameter; the use of ball bearings throughout the drive; and the location of the spindle driving gear at the lowest point of the head and on the large diameter of the spindle.

The operating levers and hand wheel are located at the front of the machine within easy reach of the operator. Without moving from his normal working



WEBO RADIAL DRILLING MACHINES



Model	Column Diameter	Length of Arm	Pre-Selector	Feeds	Speeds (RPM)	Total H.P.
R-1b-S	9 $\frac{1}{2}$ "	2 $\frac{1}{2}$ '	No	3	I. V. 42—1260	4
*R-3-b	11 $\frac{1}{8}$ "	3' or 4'	No	6 .0016" to .047"	I. V. 38—2375	6 $\frac{1}{2}$
*R-4-b	13 $\frac{3}{4}$ "	4' or 5'	No	9 .0016" to .083"	I. V. 30—2100	9 $\frac{1}{2}$
*BR-32-R	11 $\frac{3}{4}$ "	3' or 4'	No	7 .002" to .048"	(12) 40—2520	6 $\frac{1}{2}$
*BR-32-V	11 $\frac{3}{4}$ "	3' or 4'	No	7 .002 to .048	I. V. 36—2160	6 $\frac{1}{2}$
*BR-40-R	11 $\frac{1}{8}$ "	3'	No	7 .002 to .048	(12) 30—1800	7 $\frac{1}{2}$
*BR-40-V	13 $\frac{3}{4}$ "	4' or 5'	No	7 .002 to .048	I. V. 36—2160	7 $\frac{1}{2}$
BR-50	15 $\frac{3}{4}$ "	4' or 5'	Yes	18 .0016—.08	(36) 26—1800	10
	19 $\frac{1}{2}$ "	6 $\frac{1}{2}$ ' or 8'	Yes	18 .0016—.08	(36) 26—1800	
BR-63	17 $\frac{3}{4}$ "	5'	Yes	18 .0016—.08	(36) 17—1220	13
	19 $\frac{1}{2}$ "	6 $\frac{1}{2}$ ' or 8'	Yes	18 .0016—.08	(36) 17—1220	

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KLINGELHOFER MACHINE TOOL COMPANY

INDUSTRIAL PARK



KENILWORTH, NEW JERSEY

position, he can start, stop and change speeds and feeds, move the spindle up and down, traverse the compound table in longitudinal and transverse directions, and raise and lower the table. Each machine is regularly equipped with two mechanical feed changes which, with the pair of feed transposing gears, give four feed changes in all. Two mechanical speed changes are quickly available through sliding gears with each pair of pick-off gears. By transposing pick-off gears it is possible to obtain as high as 54 speeds and 33 feeds.

Colburn machines are good for quantity duplicate work. Simplified design makes operation easy, combining speed with power. The Colburn is made by Consolidated Machine Tool Corp., Rochester 10, N. Y.

Kent duplex automatic drilling machine

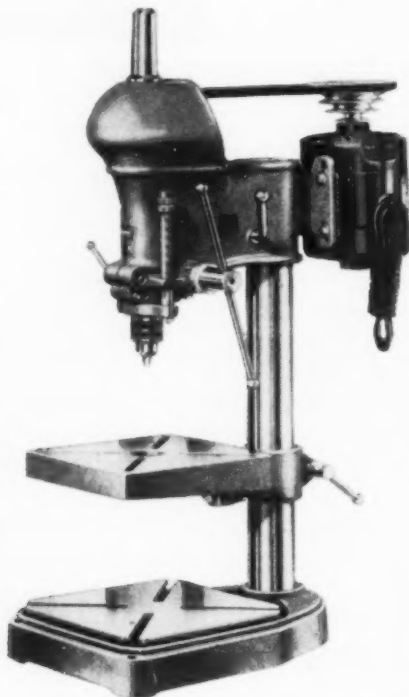
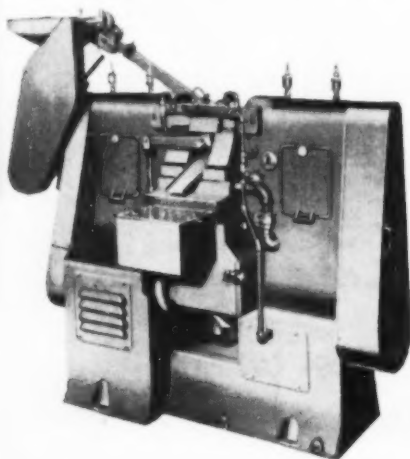
The Kent duplex spindle drilling machine was designed primarily for fast, economical drilling of cotter pin holes in screws, bolts, etc., either through the head or the shank, yet it is applicable to a variety of drilling problems of a similar nature. They're made by The

Kent Machine Co., Cuyahoga Falls, Ohio.

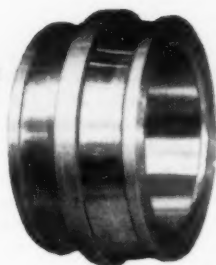
While being drilled, the work is held rigidly by two grip jaws fitted with bushings to guide the drills. Drills enter from opposite sides of the work simultaneously and proceed to a point near the center. One drill is then withdrawn and the other follows through, completing the hole. By using a combination drill and countersink both sides of the hole can be countersunk with the drilling.

Duro 14" production ball bearing

The Duro production type drill press of heavy and massive construction, offers a unit capable of performing work which requires accuracy and precision.



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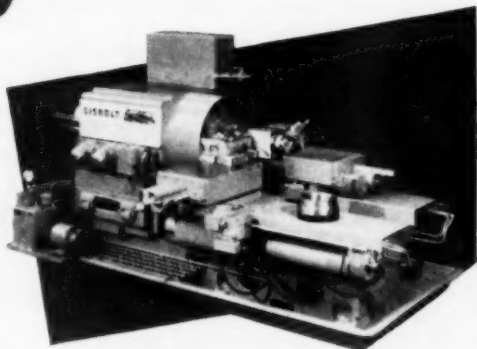
Speed is important, of course. But precision is the governing factor. How the Gisholt No. 24 does the job is a story that might mean real savings for you, too.

The No. 24 Hydraulic Automatic Lathe is a larger version of the famous No. 12 that has an outstanding success record on hundreds of jobs. If you have large volume precision work up to 24" diameter, the Gisholt No. 24 is the machine to investigate. Write for full information.

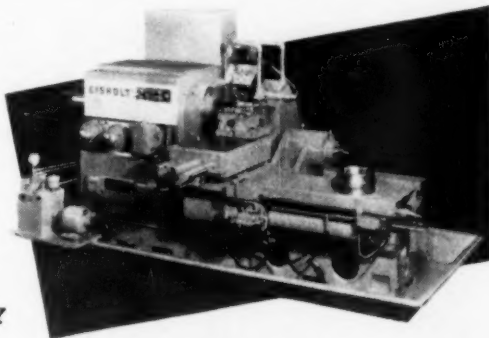
GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

THE GISHOLT ROUND TABLE represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



First Operation: Chucked on OD with 3-jaw hydraulic chuck, part is turned up to the jaws, faced, chamfered, bored and bore radius formed. Cam relief on rear tool block turns boring bit clear of workpiece as it is withdrawn.



Second Operation: Part held on expanding arbor by hydraulic pressure is finish turned, faced, chamfered and bore radius formed. Special rocker arm type carriage at rear tips in shaving tools to form both roller grooves with feed of .003" to .0045."

TURRET LATHES • AUTOMATIC LATHES
SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

The head mechanism, containing four ball bearings, has a six spline spindle mounted on a 2" dia. quill. The four step pulley is mounted separately from the spindle on an upper sleeve of machined steel running on New Departure ball bearings eliminating belt strain and binding on the spindle. Two additional ball bearings take both radial and thrust loads.

The spindle, tapered and ground for a No. 33 Jacobs taper, has a threaded collar for removal of the chuck. The head is fitted with a spiral coil spring for returning quill. Versatile, it is capable of drilling, routing, mortising, shaping and sanding operations. Made by Duro Metal Products Co., 2649 N. Kildare, Chicago, Ill.

Boice Crane helmet heads

Series 2600 Boice-Crane presses (930 W. Central, Toledo 6, Ohio) have a reputation in industry for unusual precision, wider work range and more capacity.

Five speeds give 25% greater range. In the spline drive, a rugged steel drive

sleeve carries one pulley without imparting belt strain to spindle. Oversize bearings, 30% larger than generally used, take all belt thrust load, never need lubrication.

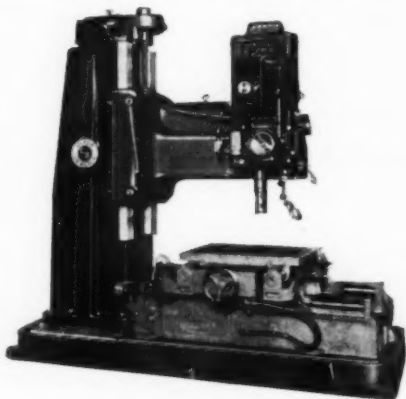
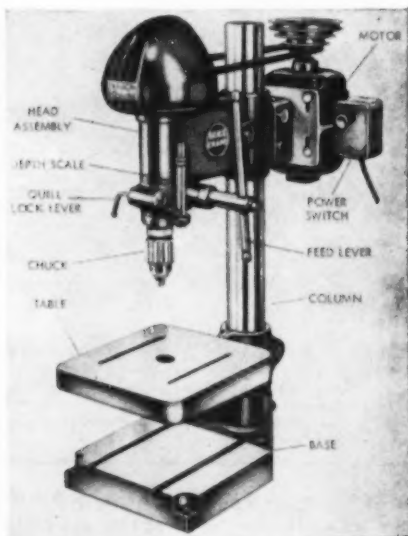
Built for larger jobs, the 2-1/16" quill is 20% larger than other 15" presses. Work tables are exceptionally smooth and accurate.

Versatile, these machines are recommended for tooling that calls for closer tolerances. Special fixtures and accessories for operations such as tapping, mortising, shaping and sanding are available.

Super Service precision drilling machine

The Super Service precision drilling machine of The Cincinnati Bickford Tool Co., Oakley, Cincinnati 9, Ohio, is especially suited to operation in conjunction with an automatic spacing table. For precision production work, jigs can thus be eliminated; the precision driller and spacing table is a feature.

A solid stub base may be had, instead of the large, heavily ribbed, tee slotted and oil grooved base. The driving motor may be 7½ h.p. or 10 h.p., 1200 r.p.m. or 15 h.p., 1800 r.p.m. The head is the same fully enclosed automatically oiled unit





THERE'S NO SUBSTITUTE FOR THE MAN WITH HOLES IN HIS HEAD
... or the Madison tools he designs

Using other than a Madison Boring Tool for suitable Madison tool applications is like putting a square peg in a round hole. That's because every Madison-engineered tool is built to do your particular boring job faster at lower cost . . . no matter whether you use a standard Madison cutter in a standard Madison bar, or specially designed Madison bars and Madison cutters . . . engineered by the "Men With Holes in Their Heads." To get the benefit of thirty-five years specialized experience in boring operations exclusively . . . thirty-five years of concentration on lowering boring costs and increasing production, write Madison today. There's no obligation.

Write for this informative Madison Bore-reaming Catalog. It's yours for the asking.

BETTER BORING TOOLS... MORE BORING EXPERIENCE



MADISON

MANUFACTURING COMPANY
 DEPT. B B MUSKEGON, MICHIGAN

supplied on the 15 h.p. drills. Power feed engagement is by either of the two conveniently placed quick-return levers which operate to engage or disengage a positive feed clutch. A safety feed gear which consists of a multiple disc clutch incorporated in the drive to the feed mechanism is a protection against overload.

Taylor Hi-Eff super sensitive drilling machines

Ten standard models in Series "A" and "B," also special models, are available from the Taylor Dynamometer & Machine Co., 528 W. Highland Ave., Milwaukee 3, Wis. The former is the bench type and the latter is either bench or floor.

Taylor machines feature a spindle that is so counterpoised as to permit feather-touch feed, enabling the operator to "feel" the bite of the drill. Tapered slingers in oil wells churn the oil into a vapor before injecting into the bearing thus providing solids from entering and insuring less vibration and noise.

Pulleys of aluminum are accurately balanced. A special chuck for drills

through a make-and-break type electrical governor integral with the motor. Other speeds up to 40,000 are also available. A step-drilling attachment that operates by an independent motor through a cam arrangement and recoil spring that provides for a six second cycle on the drill advance is obtainable. The feed mechanism is composed of a fine-tooth rack and pinion, operated by a small hand wheel.

Buffalo No. 18 drilling machines

Buffalo Forge Co., Buffalo, N. Y., makes their No. 18 drill in 19 models, a line-up that enables the most exacting to secure the arrangement desired. All models have an 18" swing.

The head frame is large and heavy and is split in front with adjustment for wear of the spindle sleeve bearing. This insures accuracy throughout the life of the machine. There are three styles of spindles available; No. 3 Morse taper is standard with No. 2 optional. Also, the machine can be furnished with a No. 3 Jacobs taper spindle. The spindles



down to .006" is available. A speed range from 800 to 10,000 r.p.m. in steps of approximately 100 r.p.m. is achieved



are multiple-splined, made of alloy steel, ground, polished and well balanced. The bearings are sealed.

Motor reverse tapping is available on

RUSNOK 1/4 H.P. CONVERTIBLE MILL HEAD



Only low cost
quill travel
attachment.

High speed
medium-light
operation.

For bench, floor
and pedestal
mills.

Fits milling ma-
chines with over-
arm 1 1/2" to 3"

3/8" end mill
capacity.

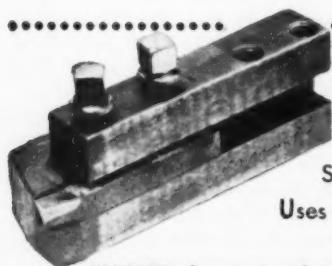
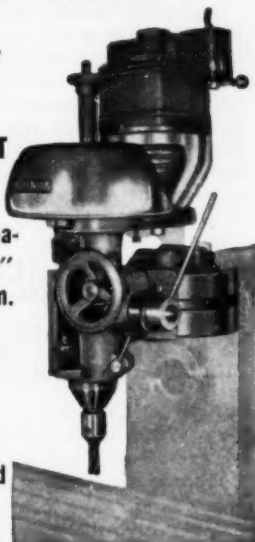
RUSNOK 1/2 H.P. MILL HEAD

HEAVY DUTY
MILLING
ATTACHMENT

Fits milling ma-
chines with 3"
to 5" overarm.

3/4" end mill
capacity.

For vertical,
horizontal and
angular
operations.



RUSNOK TOOL HOLDERS

For square turret post on turret lathes and lathes.

Slashes costs on cutting tools.

Uses standard 1/2" tools.

**WRITE for complete details and give name of your
machine tool supplier**

HEAVY DUTY

RUSNOK

ATTACHMENT

MILLING • DRILLING • BORING

RUSNOK TOOL WORKS • 4840 W. NORTH AVE. • CHICAGO 39, ILL.

all No. 18 drill models. It is not recommended for taps under $\frac{1}{4}$ " and will tap up to $\frac{3}{4}$ " national fine thread in cast iron or $\frac{1}{2}$ " coarse thread in mild steel.

Standard two or three phase motors are satisfactory for occasional tapping in maintenance shops or tool rooms. For the general machine shop where even short production runs are made, it is recommended that a high torque, high slip reversing motor be used. Motor reverse tapping is not available for d.c. or single phase.

Electro-Mechano 16" precision machines

The drilling machine line of the Electro-Mechano Co., 261 E. Erie St., Milwaukee, Wis., includes an 8" series

of hand and air operated machines, .004" to $\frac{5}{32}$ " capacity, with variable speeds from 1000 to 10,000 r.p.m. and 2500 to 15,000 r.p.m. The larger unit is a 16" hand feed unit or $\frac{1}{2}$ " capacity with variable speed and back gears. Instant wide range speed selection from 150 to 4,000 r.p.m. is one of its outstanding features.

The speed control and motor are enclosed in a streamlined housing, all to the front of the column for no wasted space or exposed moving parts. Precision cut and lapped wide faced helical back gears train makes it possible to obtain really slow spindle speeds down to 150 r.p.m. There's an instant set quill depth stop with vernier for fine depth adjustment.

Barnes line of drilling machines

The Barnes Drill Co., 814-830 Chestnut St., Rockford, Ill., has various models of standard drilling, tapping and reaming machines. These include the 201 $\frac{1}{4}$, 221 $\frac{1}{2}$, 242 and 262 having multiple speeds and feeds and the single purpose machines models, 210 and S201, also hydraulic machines H-3 and H-4 Hydrams.

Heads are units in themselves, containing all the working parts in the case of the self-oiling machines. The heads may be conveniently used in gang style of two to six spindles. Columns are of deep, sturdy box section design, either for box column or for independent column style.

Spindles and sleeves are of nitralloy steel, both surface-hardened after all machining work by the nitriding process, giving an extremely hard case about $\frac{1}{32}$ " deep.

Timken bearings are used for all speed change shafts and spiral crown gears. Ball bearings are used for the drive shaft and for the hand wheel shafts. Spur geared feeds eliminate the usual worm and worm gear.



Providence precision drilling machines

The precision drills made by the Providence Engineering Works, Inc., 521 S. Main St., Providence, R. I., have as an outstanding feature, the use of high grade ball bearings at every rotating point, largely self lubricating, and mounted to exclude dust and moisture. Long life and accuracy are claimed from the oversize of the spindle and sleeve. Feed rack teeth are accurately cut in the all-steel spindle sleeve itself, which also carries the full length guide key.

Four quick-change speeds, each instantly secured by one complete turn of the handle, are locked by a shifter fork. The large table guides are accurately finished and fitted, giving freedom of movement without looseness affecting the accuracy of the table. The drill column is heavy and strongly reinforced to assure rigidity and freedom from vibration.

Champion No. 2000 high speed drill

Manufactured by the Champion Blower and Forge Co., Lancaster, Pa., this high speed drilling machine that swings to the center of a 20-inch circle, is a full ball-bearing production drill of up to 1" capacity.

A stocky, direct V-belt drill, it has six speeds for versatility. The table raises and lowers with a crank, all gears

enclosed. It also tips to any angle up to 45 degrees and can be swung out of the way. The drill-head is clamped to the ground column and can be raised or lowered or swung completely around. The depth gauge for drilling can be set to drilling any depth desired up to 5". The spindle is graduated in 1/16" increments and is bored for No. 3 Morse taper shank bits. The machine can be equipped with either 1 h.p. ball-bearing motor for capacity up to 1" or 1/2 h.p. for capacity up to 3/4".

Royersford-Excelsior improved 21-inch power drills

This machine made by the Royersford Foundry & Machine Co., Inc., Royersford, Penn., is available in either the motor-driven or v-belt styles. Either one is thoroughly modern and up-to-date, combining the features that make for simplicity and speed in operation with strength and rigidity plus accuracy, from the smallest hole up to 1 1/2".

The gears are machine cut. The bearings are all large and powerful; the change from a plain drill to a back-gear unit is done in an instant by sliding the gears. There's a ball bearing thrust on the top and bottom of the spindle.

The drills are made with square bases with eight speeds and three distinct and complete feeds—power, hand screw, and lever.

Specifications of American-built drilling machine

The Cincinnati Bickford Tool Co.				Cincinnati, Ohio
Type and Model	C=Column to C. of Spindle T=Tap leads ST=Spindle Travel	T=Taper SB=Spindle to base	B=Size of base TH=Travel of head	S=Speeds F=Feeds
Precision Drilling Machine	C=47" T=8, 11 1/2, 14, 18, 20, 27 ST=16"	T=No. 5 M.T. SB=71" plain base	TH=30"	S=36 F=18; .004" to .125"

Champion Blower & Forge Co.
Lancaster, Pa.

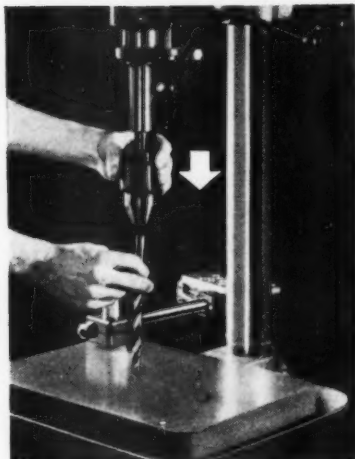
Type and Model	C=Capacity SC=Swings to Center of Circle CC=Column to Center of Spindle ST=Spindle Traverse	T=Taper ST=Spindle to Table SB=Spindle to Base	WT=Work. Surface of Table WB=Work. Surface of Base TR=Table Travel S=Speeds	Remarks
High Speed Model 2000	C=1" SC=20" CC=10½" ST=5"	T=No. 3 M.T. ST=27" SB=43½"	WT=14½"x12½" WB=15½"x12½" TR=18" S=6" 340-3080	
Utility and Tool Room No. 16 F No. 16 B	C=½" ST=4"	SB=46" (Chuck)	WT=10"x10" WB=10"x10" S=450-5100	Specs. for No. 16 B same as for No. 16 F except: SB=16" (Chuck) ST=10" (Chuck); Table Traverse=9"
No. 21	C=0" to 1½" SC=21½" CC=10½" ST=12"	T=No. 4 M.T. ST=27¾" SB=43"	WT=16" dia. TR=21" Feeds=.002", .005", .008" S=8 15-405	
No. 24	ST=12"	T=No. 4 M.T. ST=27½" SB=43"	WT=18" dia. TR=21"	

The Electro-Mechano Company
Milwaukee, Wis.

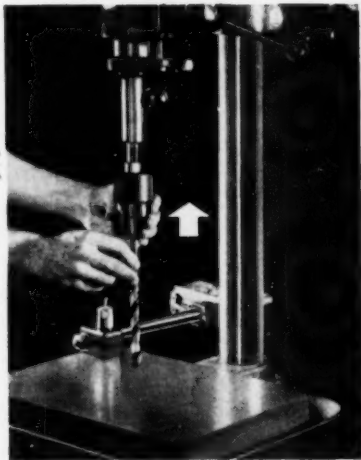
Model and Type	Q=Quill Feed, Micro and Direct S=Spindle Stroke T=Taper	CB=Chuck to Base, Max. C=Column to Chuck Center	T=Table Size B=Base Size	S=Speeds F=Feed
High Speed Precision Model 105 Model 106	Q=¼" and 1" S=1½"; Model 105 drills .004" to 5/32"; Model 106 Drill's No. 60 to 5/32"	CB=7" C=4"	B=12"x14"	S=1000 to 10,000 or 2500 to 15,000 F=Micro and Direct, Model 105 F=Direct only, Model 106
Model 101 Model 102	Q=¼" and 1" S=1" Model 101 drills .004" to 3/32" Model 102 drills No. 60 to 3/32"	do	B=6½"x9½" T=6"x6"	S=1000 to 10,000 or 2500 to 15,000 F=Micro and Direct, Model 101 F=Direct only, Model 102
Precision Model 601 Bench	Drills 1/16" to ½" S=4" T=No. 2 M.T., or Jacobs	CB=17" C=8¾"	T=14"x18"	S=150 to 4,000
Model 601 Floor	do	CB=44" C=8¾"	T=11"x12" B=10"x14"	do

Change tools *in seconds* with this **FULLY-AUTOMATIC CHUCK**

no keys . . . collets . . . or wrenches



**SPINDLE
NEVER
STOPS**



HERE'S ALL THERE IS TO CHANGING TOOLS

TO OPEN—Grip Sleeve—pull down—jaws *
open automatically—tool is released.

TO CLOSE—Insert new tool—push up
tapered part—tool is locked in place.

SAVE TIME—Change tools with spindle running . . . no keys, collets or wrenches needed. Ideal for fast, uninterrupted production.

SAVE MONEY—One spindle does the work of several. Smooth, hardened and ground jaws grip tight without chewing tools. Grip increases with load.

IDEAL FOR—Precision drilling or for spotting, drilling and reaming in boring or milling machines; in lathe work for burring, turning and filing.

*Available in two capacity ranges,
1/64" to 3/8" and 1/32" to 1/2".*

Order from **your local industrial supply distributor** or write for illustrated folder to:
Wahlstrom/Float-Lock Sales Dept., American Machine & Foundry Co.,
511 Fifth Ave., New York 17, N. Y.



Consolidated Machine Tool Corp.
Rochester 10, N. Y.

Type and Model	CS=Capacity in Solid Steel C=Capacity in Mild Steel S=Rated Swing L=Length of Power Feed T=Spindle Travel	CS=Center of Spindle to Face of column ST=Max. Dist. Spindle nose to plain table SB=Max. Dist. Spindle nose to base T=Taper in Spindle (Morse)	WT=Work Surface of plain table V=Vertical adjustment plain table WB=Work surface of base	S=No. of Speeds F=No. of Feeds H.P. Horse Power
Manufacturing Type Drilling Machines Colburn No. 2	C=1 1/4"; S=20"; L=12"	CS=10 1/2"; ST=28"; SB=43 1/4"; T=No. 4	WT=16" x 16"; V=13"; WB=16" x 18 1/2"	S=38; F=33; H.P.=5
No. 4	C=2"; S=20"; L=16"	CS=12 1/4"; ST=33 1/4"; SB=49 1/4"; T=No. 5	WT=18" x 20"; V=13"; WB=20" x 20"	S=54; F=28; H.P.=7 1/2
No. 6	C=3"; S=20"; L=18"	CS=14 1/2"; ST=36"; SB=53 1/4"; T=No. 5	WT=20" x 24"; V=13"; WB=24" x 24"	S=47; F=31; H.P.=10 or 15
Gang Drills Colburn No's 2,4,6	Also available in 2, 3, or 4 Spindles. Specs. the same except center to center dist. of drills and sizes of plain and work bases. Center to Center of Drills No. 2; 2, 3, 4 Spindles=20". No. 4; 2, 3, 4 Spindles=27". No. 6; 2, 3, 4 Spindles=33". Work Surface of Table: No. 2; 2 Spindles=16" x 36"; 3 spindles=16" x 56"; 4 spindles=16" x 76". No. 4; 2 spindles=18" x 45"; 3 spindles=18" x 72"; 4 spindles=18" x 99". No. 6; 2 spindles=20" x 57"; 3 spindles=20" x 90"; 4 spindles=20" x 123". Work Surface of Base: No. 2; 2 spindles=18 1/4" x 36"; 3 spindles=18 1/4" x 56"; 4 spindles=18 1/4" x 76". No. 4; 2 spindles=20" x 47"; 3 spindles=20" x 74"; 4 spindles=20" x 101". No. 6; 2 spindles=24" x 57"; 3 spindles=24" x 90"; 4 spindles=24" x 123".			
Heavy Duty Colburn D-Type D-4	CS=3 1/4"; S=24"; T=16"	CS=12 1/8"; ST=34"; SB=50 1/2"; T=No. 5	WT=18" x 24"; V=15"; WB=21 1/4" x 24"	S=8, 30 to 343; F=.010" to .061"
D-6	CS=3 1/4"; S=36"; T=16"	CS=18 1/8"; ST=36"; SB=53"; T=No. 5	WT=24" x 26"; V=15"; WB=28" x 30"	do
D-7	CS=3 1/2"; S=48"; T=16"	CS=24 1/8"; ST=36"; SB=53"; T=No. 5	WT=30" x 26"; V=15"; WB=32" x 34"	do
D-8	CS=5"; S=46"; T=18"	CS=18 1/2"; ST=46"; SB=63"; T=No. 6	WT=24" x 26"; V=15"; WB=32" x 32"	S=8, 23 to 262; F=.005" to .033"
D-10	CS=6"; S=40"; T=20"	CS=20 1/2"; ST=46"; SB=63"; T=No. 6	WT=26" x 26"; V=15"; WB=32" x 32"	do

The Kent Machine Co.
Cuyahoga Falls, Ohio
Automatic Drilling Machine

Company makes a line of automatic drilling machines having max. drill diameter in steel or cast iron of 3/8"; in brass or aluminum of 1/4". Min. length under head is 1/2"; max. is 2 1/2" hopper feed. Min. drill dia. is 1/15"; max. dia. (std.) is 1/2".

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**HEIGHT
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- Easily adjustable to compensate for wear.
- Supplied in wooden case.

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0-18"	140.00
0-24"	240.00

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Measuring range 0-12"
Length of scribing needle . . . 2 1/2"
Size of feet plate 3 1/2" x 2 1/4" x 1 1/4"
Net weight 3 1/2 lbs. Gross weight 5 3/4 lbs.

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Providence Eng. Works, Inc.
Providence, R. I.

Model and Type	C=Capacity, Steel and C.I. O=Overhang S=Spindle Traverse	ST=Spindle Nose to Table	WT=Work Surface of Table	Remarks
Precision Model H	C= $\frac{3}{4}$ " and $\frac{1}{2}$ " O=8" S=14"	ST= $1\frac{1}{2}$ " to $32\frac{1}{2}$ "	WT=16"x16"	Also available in 2, 3, 4, 6 Spindles. Spindles are 9" C. to C. Work Surface of Table: 2-Spindles= $16"$ x $25"$; 3-Spindles= $16"$ x $34"$; 4-Spindles= $16"$ x $43"$; 6-Spindles= $16"$ x $61"$
Model K	do	do	WT=24"x24"	Also available in 2, 3, 4, 6 Spindles. Spindles are 9" C. to C. Work Surface of Table: 2-Spindles= $24"$ x $33"$; 3-Spindles= $24"$ x $42"$; 4-Spindles= $24"$ x $51"$; 6-Spindles= $24"$ x $69"$

Company also makes a Model E, bench; and Model F, floor.

Taylor Dynamometer & Machine Co.
Milwaukee 3, Wis.

Model and Type	C=Capacity in C.I. and Mild steel DC=Drills to Center ST=Spindle Travel	T=Taper CT=Chuck to Table CB=Chuck to Base S=Spindle Feed	WT=Work Surface of Table WB=Work Surface of Base TH=Travel of Head S=Speeds	Remarks
Sensitive "A" Series Model A-102	C=.002" to .040" DC=11" ST=2 $\frac{1}{4}$ "	CT=9 $\frac{1}{4}$ " T=No. 2 M.T.	WB=9"x10" TH=10" S=750-4000 or 1500-8000	Other models in this series and range of holes: A-104— .005" to .040" A-106— .010" to .065" A-107— No. 80 to .125" A-110— No. 80 to $\frac{3}{8}$ "
"B" Series Model B-200	C=.010" to $\frac{1}{4}$ " DC=20" ST=4 $\frac{1}{4}$ "	CT=18 $\frac{1}{4}$ " T=No. 2 M.T.	WB=13"x14" TH=16" S=750-4000 or 1500-8000	Other models in this series and range of holes: B-202— .012" to $\frac{1}{8}$ " B-204— .012" to $\frac{3}{8}$ " B-206— .015" to $\frac{1}{2}$ " B-208— 1' 6" to $\frac{3}{8}$ "

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THREAD TOOL

No operator skill required to produce perfect threads. Duplicates threads without gauging. Mounts on any screw-cutting lathe. Write for Bulletin 110.



LOCKJAW

Set-ups stay put! Grips both downwards and sideways... eliminates bolting and clamping. Used on all table top machine tools. 2 sizes available. Write for Bulletin 140-A.



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My city and state _____

My occupation (type of engineer) _____

Sibley Machine Foundry Corp.
South Bend 23, Ind.

Model and Type	C=Capacity in C.I. and mild steel TP=Tapping Capacity DC=Drills to Center	T=Taper ST=Spindle to Table SB=Spindle to Base S=Spindle Feed	WT=Work Surface of Table WB=Work Surface of Base TH=Travel of Head	S=Speeds F=Feeds
Drilling Machines Model D-24	C=2" and 1 1/2" TP=1 1/2" DC=24 1/4"	T=No. 4 M.T. ST=35" SB=20" and 52 1/2" S=11"	WT=21" Dia., or 22"x26" WB=20 1/2"x21 1/2" TH=25"	S=21 to 365 others optional; F=.006"-.020"
Model D-28	C=2" and 1 1/2" TP=1 1/2" DC=29"	do	WT=25" Dia., or 22"x26" WB=20 1/2"x21 1/2" TH=25"	do
Model E-25	C=1" and 3/4" DC=25"	T=No. 3 M.T. ST=25" S=8"	WT=15"x23" WB=14 1/4"x14 1/4" TH=20 1/2" (Traverse of Table on column)	S=540-2160, 412-1648, 360-1440, 275-1100, 206-824 others optional.
Model C-20	C=1 1/2" and 1 3/4" DC=20 3/4" TP=1" pipe threads	T=No. 3 or 4 M.T. ST=24" SB=33" to 41" S=8"	WT=13 1/2"x15 1/2" WB=13 1/2"x13 1/2" TH=10 1/2" (traverse of table on column)	S=65-1360 F=.003", .006", .010"

Boice-Crane Co.
Toledo, Ohio

Model and Type	C=Drill Capacity in Cast Iron T=Tapping Capacity in Brass S=Spindle Travel	D=Drill to Center of Circle T=Std. Tilting Table P=Production Table B=Bench Base FB=Floor Base	C=Chuck to Table CB=Chuck to Base S=Speeds	Remarks
Drill Presses Series 2600 Bench	C=1 1/2"; T=1 1/2"; S=4"	D=15"; T=10"x11"; P=11" x 16"; B=10"x10";	C=10 1/2"; CB=17 1/2"; S=5	This series available in multiple spindle models. Specs. same except work surface of tables:
Series 2600 Floor	do	do FB=10"x14"	C=39 1/2"; CB=46 1/2"	2-Spindles=24" x 15 1/2"; 3-Spindles=36" x 15 1/2"; 4-Spindles=48" x 15 1/2"; Chuck to Table=27". Standard models have columns mounted on 12" centers. Company also announces Series 1650 Drill presses. Specs. not yet available.



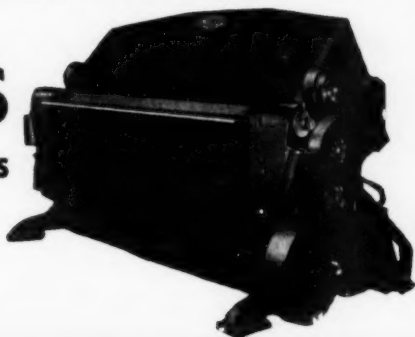
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Model and Type	C=Capacity S=Swing V=Vert. Travel of Spindle TC=Tapping Capacity	D=Dist. Column to Spindle Center ST=Spindle to Table SB=Spindle to Base, max. min.	W=Work Surface of Table V=Vertical Adjustment of Table S=No. and Range Speed D=Dia. of Round Table F=No. and Range Feeds	Remarks
Drilling and Topping Machines No. 201 1/2 Box Column	C=1 1/4" S.D.E. 1035; S=20"; V=12"; TC=2" U.S. std. mild steel	D=10 1/4"; ST=33 1/2"; SB=46" and 34"	W=15" x 24"; V=17"; S=6; 95-943;	Also available in Gang Drills. Specs. the same except Working Surface of Table; 2-Spindles=14" x 42 1/2" 3-Spindles=14" x 66 1/2" 4-Spindles=14" x 90 1/2"
No. 201 1/2 Pound Column	do	D=10 1/4"; ST=33 1/2"; SB=47" and 35"	W=14" x 14"; V=19 1/2"; S=6; 95-943 D=16"	
No. 210	C=3/8" to 1 1/2" Solid Steel V=12"; No. 4 M.T.; S=21"	D=10 1/4"; ST=38"; SB=51 1/2"	W=17" x 28"; V=23" S=203 to 1390; F=9; .005" to .047" Lead screw feed 8, 11 1/2", 14, 18.	Also available in Gang Drills. Specs. same except Work Surface: 2-Spindles=16" x 44"; 3-Spindles=16" x 68"; 4-Spindles=16" x 92"
No. 221 1/2	C=1 1/2" S.A.E. 1035; S=22"; V=14"; TC=2 to 3 U.S. std.; 3 to 4 Pipe Threads	D=11 1/4"; ST=33" No. 4 M.T.; SB=46 1/2"	W=26" x 16"; V=23" (Square column); 19" (Round column) S=8;	Gang Drills. Work. Surface: 2-Spindles=14" x 42 1/2"; 3-Spindles=14" x 66 1/2"; 4-Spindles=14" x 90 1/2"; 5-Spindles=14" x 114 1/2"; 6-Spindles=14" x 139 1/2"
No. 242	C=2" S.A.E. 1035; S=24"; V=16"; TC=2 1/2 to 3 1/2 U.S. std.; 4 to 6 pipe threads	D=12 1/4"; ST=32" No. 5 M.T.; SB=45 1/4"	W=28" x 18"; V=23" (Square column); 21" (Round column) S=8; 64 to 708 F=8; .005" to .062"	Gang Drills. Work. Surface: 2-Spindles=16" x 44"; 3-Spindles=16" x 68"; 4-Spindles=16" x 92"; 5-Spindles=16" x 116"; 6-Spindles=16" x 149"
Drilling, Boring, Reaming No. 11-3 Hydraulic Feed	C=1" S.A.E. 1035; S=32"; V=16";	D=16 1/4"; ST=34 1/2"; SB=49" and 33"	W=32" x 19"; V=23" No. 5 M.T. S=42 to 648 r.p.m. F=1" to 11" per min.	

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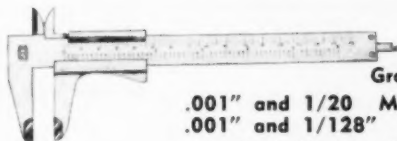


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Barnes Drill Company

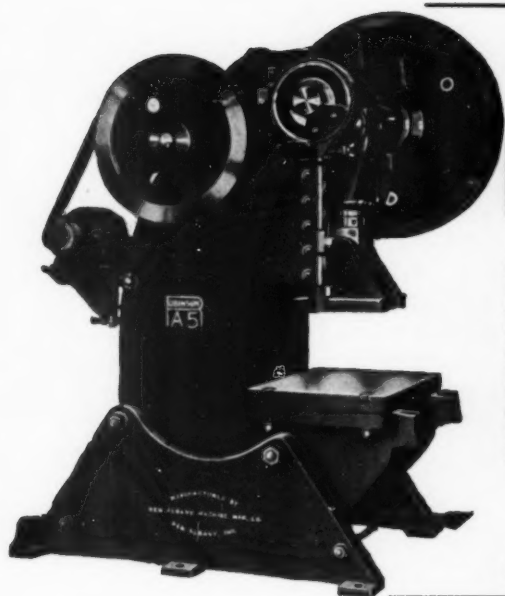
Rockford, Ill.

Model and Type	C=Capacity S=Swing V=Vert. Travel of Spindle TC=Tapping Capacity	D=Dist. Column to Spindle Center ST=Spindle to Table SB=Spindle to Base, max. min.	W=Work Surface of Table V=Vertical Adjustment of Table S=No. and Range Speed D=Dia. of Round Table F=No. and Range Feeds	Remarks
No. H-4 Hydraulic Feed	C=4" S.A.E. 1035; S=40"; V=20";	D=20 1/4"; ST=3 1/2"; SB=49 3/4" and 20 1/4"	v ₁ =34% x 21 1/2"; V=22" No. 6 M.T. S=39 to 422 r.p.m. F=1" to 25" per min.	
Drilling and Tapping No. S 201	C= 1/2" to 1" in mild steel S=20"; V=120"	D=10 1/4"; ST=34"; SB=46"	W=14"x14"; V=17" No. 4 M.T. S=69 to 1296 r.p.m. F=.0031" to .031"	Gang drills. Machines have no tables, but can be provided. S-201 built-in 2,3,4,5,6 sp. Types, either ind. columns, box columns, and one-piece table. Each Spindle independent as to speeds and feeds.
No. 262 Sliding Head	S=2" S.A.E. 1035; S=26"; V=16 1/2" travel of sliding head; TC=2" U.S. std. tap in mild steel or 4" pipe tap in cast iron	D=13 1/2"; ST=36"; SB=49" and 14"	W=18" x 28"; V=16 1/2"; S=8; 64 to 708 F=.005" to .085" No. 5 M.T.	Gang drills: Work Surface: (Box column) 2-Spindles 18"x48"; 3-Sp. = 18"x72"; 4-Spindles=18"x96"; Work surface (Ind. Round, Square columns) 2,3,4-Spindles = 17"x17"

Duro Metal Products

Chicago 39, Ill.

Model and Type	C=Capacity DC=Drills to Center of Circle S=Spindle Travel CC=Chuck Capacity (Jacobs)	T=Taper CT=Chuck to Table CB=Chuck to Base	WT=Work. Surface, Table WB=Work. Surface, Base	S=Speeds
Drill Press 14" Model F-3083 Bench	DC=14" S=3 1/2" (C=0" to 1/2")	T=No. 31 Jacobs; CT=10 1/4" CB=13 1/4"	WT=7 1/2" x 7 1/2" WB=8" x 8"	S=780-3800
14" Model V 3080 Model V 3081	C= 1/2" in C.I. DC=14" S=4" CC=0" to 1/2"	T=No. 31 Jacobs CT=11 1/4" Model V 3080 CB=41 1/2" Model V 3081	WT=10" x 10" WB=11" x 11"	S=590-5000
18" Floor Production	C= 1/2" DC=18" S=5"	T=No. 2 M.T.; CT=20" CB=44 1/2"	WT=14" x 18" WB=12" x 12"	S=450-1965

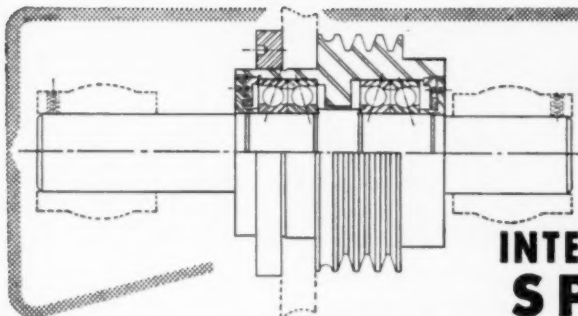


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Buffalo Forge Co.
Buffalo, New York

Model and Size	C=Capacity in C.I. F=Feed Travel SC=Spindle to Center of Column T=Taper	ST=Max. Dist. Spindle or Nose to Table SB=Max. Dist. Spindle or Nose to Base V=Vert. Adjustment, Table	S=Speeds F=Feeds WT=Work. Surface, Table WB=Work. Surface, Base	Remarks
Drilling Machines				
No. 13 Bench	C= $\frac{1}{2}$ " F=3" SC=6 $\frac{1}{2}$ "	ST=11" SB=15"	S=850-3400 WT=7"x7" WB=8"x8"	
No. 14 Floor Sensitive	SC=7" F=4 $\frac{1}{4}$ " T=Jacobs No. 2 or M.T. No. 1 or 2	ST=(Bench type) 1" to 11" or 0" to 10 $\frac{1}{2}$ " ST=(Floor Type) 3" to 29 $\frac{1}{2}$ " or 3" to 29" V=16"	S=600-3600; 900-4800; 1800-9600 WT=14"x18"	Available in 1, 2, 3, 4, 6 Spindles. Specs. the same, except: Work Surface of Table, WT=2-Spindles=14"x30"; 3-Spindles=14"x42"; 4-Spindles=14"x54"; 6-Spindles=14"x65 $\frac{1}{4}$ "
No. 14 Bench	SC=7" F=4 $\frac{1}{4}$ " T=Jacobs No. 2 or M.T. No. 1, 2	ST=1" to 11" V=16"	S=600-3600; 900-4800; 1800-9600 WT=14"x14"	Available in 2, 3, 4, 6 Spindles. Work Surface of Table: WT=2-Spindles=14"x26"; 3-Spindles=14"x38"; 4-Spindles=14"x50"; 6-Spindles=14"x78 $\frac{1}{2}$ "
No. 2 Pedestal Motor Spindle	SC=13" F=6" C= $\frac{5}{8}$ " (or $\frac{1}{2}$ " in steel) T=No. 3, M.T. Overhang=13"	ST=28" V=18"	S=4 600-1800 or 450-1200; 450-1200, or 600-1800 F=4; .003"-.012" WT=23"x22"	Available in 2, 3, 4, 5, 6 Spindles. Work Surface: 2-Spindles=23"x46"; 3-Spindles=23"x58"; 4-Spindles=23"x70"; 5-Spindles=23"x83"; 6-Spindles=23"x96"
No. 3 Pedestal Motor Spindle	SC=11" F=8" C=1" (or $\frac{3}{4}$ " in steel) T=No. 4 M.T. Overhang=13"	ST=24" V=18"	S=4; 600-1800, or 450-1200; 450-1200, or 600-1800 F=4; .003"-.012" WT=23"x22"	do

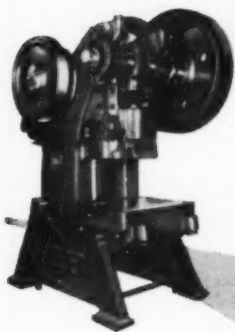
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POWER PRESSES

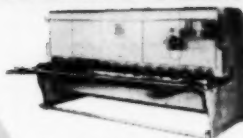
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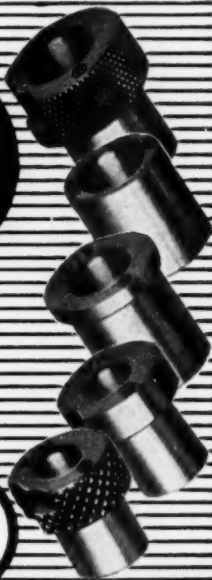
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Buffalo Forge Co.		(Continued from preceding page)		Buffalo, New York
No. 2 Pedestal RPMater	SC=13" C=1" mild steel F=6" T=No. 3 M.T.	ST=27" V=18"	S=500-2000; 125-500 Other speeds depending on motor F=.003"-.012" WT=23"x22"	Available in 2, 3, 4, 5, 6 Spindles. Work Surface: 2-Spindles=23"x46" 3-Spindles=23"x58"; 4-Spindles=23"x70"; 5-Spindles=23"x83"; 6-Spindles=23"x96"
No. 3 Pedestal RPMater	SC=13" C=1 1/2" mild steel F=8" T=No. 4 M.T.	ST=27" V=18"	S=300-1300, 75-325 other speeds depending on motor F=.006"-.019" WT=23"x22"	do
No. 13 Bench	C=1 1/2" F=3" SC=6 1/2"	ST=11" SB=15"	S=4; 850-3400 WT=7"x7" WB=8"x8"	
No. 15 Heavy Duty Floor	C=1 1/2" F=4" SC=7 1/2" T=Jacobs 33	ST=41" SB=47"	S=460-6300 Others depending on motor WT=10"x11" WB=10"x10"	Available in 2, 3, 4 Spindles. Work Surface: 2-Spindles=14"x26"; 3-Spindles=14"x38 1/2"; 4-Spindles=14"x50 1/2"; Chuck to base=20" Dist. between centers=12"
No. 15 Heavy Duty Bench	C=1 1/2" F=4" SC=7 1/2" T=Jacobs 33	ST=11" SB=47"	S=460-6300 Others depending on motors WT=10"x11" WB=10"x10"	do
No. 15 Manufacturing	do	SB=14"	S=460-6300 Others depending on motors WB=14"x14"	Available in 2, 3, 4 Spindles. Work Surface: 2-Spindles=14"x26"; 3-Spindles=14"x38 1/2"; 4-Spindles=14"x50 1/2"
No. 15 Pedestal	do	do	S=460-6300 Others depending on motors WT=14"x18"	Available in 2, 3, 4, 6 Spindles. Work Surface: 2-Spindles=14"x30"; 3-Spindles=14"x42"; 4-Spindles=14"x54"; 6-Spindles=14"x65 1/2"

Buffalo Forge Co. (Continued from preceding page)			Buffalo, New York	
No. 16 Sensitive 8" Overhang	C=7 1/8" (mild steel) F=5 1/4" Sensitive with power stop T=No. 2 M.T.	ST=17 1/2" bench, 32 1/2" floor 27" pedestal	S=400-500 Others depending on motor WT=14"x14" bench; 17 1/2"x16 1/2" ped.	Available in 2, 3, 4, 5 & 6 Spindles. Work Surface; bench: 2-Spindles= 14"x26"; 3-Spindles= 14"x38"; 4-Spindles= 14"x50"; 5 & 6 Spindles= 14"x74 1/2" Work Surface, pedestal: 17 1/2"x16 1/2"; 3-Spindles= 17 1/2"x28 1/2"; 4-Spindles= 17 1/2"x36 1/2"; 5 & 6 Spindles= 17 1/2"x54 1/2"
No. 16 Power Feed 8" Overhang	C=7 1/8" (mild steel) F=6" T=No. 2 M.T. (F=5 1/4" Sensitive)	ST=18" bench 30" floor 27 1/2" pedestal	S=do WT=14"x14" bench; 17 1/2"x20 1/2" ped.	Available in 2, 3, 4, 5 & 6 Spindles. Work Surface, bench: 2-Spindles= 14"x30"; 3-Spindles= 14"x46"; 4-Spindles= 14"x62"; 5 & 6 Spindles= 14"x92 1/2" Work Surface, pedestal: 2-Spindles= 17 1/2"x20 1/2"; 3-Spindles= 17 1/2"x36 1/2"; 4-Spindles= 17 1/2"x54 1/2"; 5-Spindles= 17 1/2"x68 1/2"; 6-Spindles= 17 1/2"x84 1/2"
No. 16 Sensitive 12" Overhang	do	ST=17 1/2" bench; 27" ped.	S=do WT=23"x18" bench 24 1/2"x16 1/2" ped.	do
No. 16 Power Feed 12" Overhang	do	ST=18" bench; 27 1/2" ped.	do	do
No. 16 Sensitive 15" Overhang	do	ST=17 1/2" bench; 27" ped.	do	do
No. 16 Power Feed 15" Overhang	do	ST=18" bench 27 1/2" ped. do	do	do
No. 18	C=1" F=5" Drills to center of Circle=18"	ST=0" to 32" SB=50"	S=265-2000 or 400-3000	

Buffalo Forge Co.		(Continued from preceding page)		Buffalo, New York	
Models A,B,C,D,	T=No. 3 M.T. Tapping Capacity= $\frac{3}{8}$ " in C.I.		WT=14"x14" WB=14"x14"		
No. 18 Models E,F,G,H, I,L,K,L	do	ST=0" to 34" SB=50"	WT=12"x12" WB=11"x12" S=do		
No. 18 Models M,N	do	ST=0" to 14" SB=24"	do		
No. 18 Models O,P,Q,R,S	do	SB=24"	S=do		
No. 21 Heavy Duty	C=1 $\frac{1}{2}$ " Drills to centers 21" F=12 $\frac{1}{2}$ " T=No. 4 Std.	ST=27" SB=40"	S=34 to 112; 160 to 560 F=.003"-.018" WT=16 $\frac{1}{2}$ " dia.		
No. 22 Round Column Floor Std. Spindle	SC=11" C=1 $\frac{1}{4}$ " steel, up to 2" in non-ferrous. F=7 $\frac{1}{2}$ " with depth stop	ST=27" SB=43"-26" min. V=20"	S=400-1350, 65-230 .004", .009", .014" WT=19 $\frac{1}{2}$ " WB=16"x16"		
No. 22 Round Column Floor Ball Bearing Spindle	do	ST=23 $\frac{3}{4}$ " SB=39 $\frac{1}{2}$ "-23" min. V=20"	do		
No. 22 Pedestal Std. Spindle	do	ST=27" V=20"	S=do F=do WT=16 $\frac{1}{2}$ "	Pedestal type available in 2, 3, 4, 5 & 6 Spindles. Work Surface: 2 Spindles= 17"x40"; 3 Spindles= 17"x66"; 4 Spindles= 17"x82"; 6 Spindles= 17"x120"	
No. 22 Pedestal Ball Bearing Spindle	do	ST=23 $\frac{3}{4}$ " V=20"	do		

Royersford Foundry & Machine Co., Inc.			Royersford, Penn.		
Model and Type	C=Capacity CS=Column to Center of Spindle S=Spindle Traverse	T=Taper ST=Spindle to Table SB=Spindle to Base	WT=Work. Surface, Table WB=Work. Surface, Base T=Table Travel on Column	Remarks	
Power Drill 21"	C=1 $\frac{1}{2}$ " CS=10 $\frac{1}{2}$ " S=9"	T=No. 3, or 4 M.T. ST=29" SB=45"	WT=18" dia.	Two styles available: One with belts enclosed, the other with belts exposed.	



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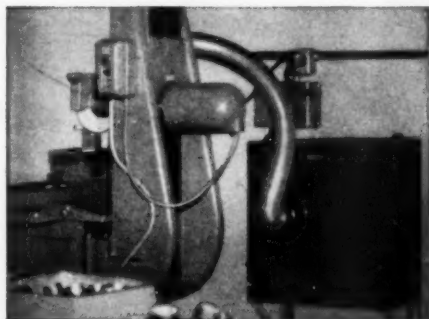
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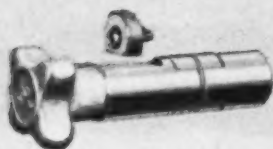
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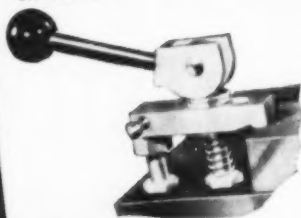
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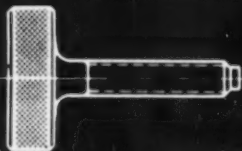
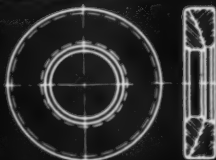
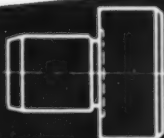
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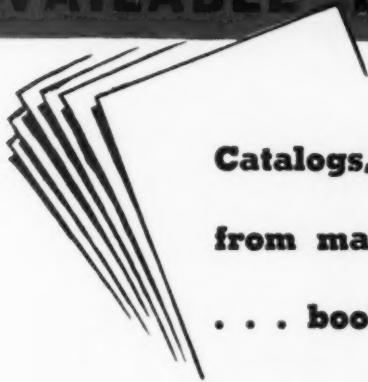
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AVAILABLE LITERATURE



Catalogs, bulletins available from manufacturers ... books, films

1. A new 24 page, two color, Catalog No. 82 of precision snap-action switches has just been published by Micro, Freeport, Ill., a division of Minneapolis-Honeywell Regulator Co. This catalog covers safety, limit, and interlock switches designed especially for switching a-c circuits in industrial and commercial applications. Write Micro, Freeport, Ill.

2. An eight page instruction book has just been published on the Moore pneumatic comparator gage. It gives the basis of operation of all their standard equipment and suggests applications which should be of interest to those using such equipment. The booklet also covers the different phases of installation and the maintenance of the units. Moore Products Co., Philadelphia 24, Pa.

3. An illustrated folder describing and giving specifications for the different models of True-Point live centers, regular and tube centers, with such features as: True center ground in place; adjustable SKF ball and roller bearings; point, housing and shank hardened and ground; double rows of SKF roller bearings, and capacity up to 6½" dia., is available from Spendrup, Inc., 37 Wall St., New York 5, N.Y.

4. Types of roll feeds they manufacture as well as their Electric precision die miller are fully described in several folders from Roll-Feeds Corp. Features claimed for the feeds include: Fit any press; can't slip; reverse instantly; feed in thousandths; maintain original setting. The milling cutter may be seen in contact with the layout at all times on both inside and outside shapes—no overhead mechanism to interfere with the operator's vision or actions. Roll-Feeds Corp., Pawtucket, R.I.

5. Straight-side, double-crank presses are described and pictured in a 20-page two-color catalog just issued by the E. W. Bliss Co. Identified as S-2 presses and incorporating dimensions and specifications established by the Joint Industry Conference, the new models include such features as pneumatic slide counterbalance cylinders and motorized slide adjustment accessories. Catalog 17-D illustrates presses with capacities ranging from 50 to 2000 tons. E. W. Bliss Co., 1358 Rapp Rd., S.W., Canton, Ohio.

6. Features of Pratt & Whitney's turbine blade airfoil grinder, including:

**WHENEVER A BLOW
IS REQUIRED . . .**

*consider lightning-fast
ELECTROPUNCH*

WIDELY USED TO

STAKE

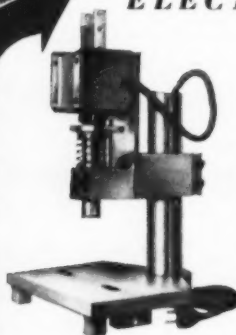
MARK

SWAGE

CUT OFF

RIVET

CRIMP



Whenever your production process demands a blow, ELECTROPUNCH may be just the machine you need. This all-electric impact hammer delivers a lightning-fast controllable blow. Produces up to 10,000 pieces per hr.

with automatic switching—as high as 5,000 pieces per hr. with hand or foot switching. Ideal for steel stamping, swaging, etc.

ELECTROPUNCH is portable, uses only one sq. ft. of bench space, plugs into any 115 V., A. C. outlet. Lightest model (illustrated) sells for only \$90.75.

Write for descriptive folder.

BLACK & WEBSTER, INC.

Dept. 3, 445 Watertown Street, Newton 58, Mass.
Phone: Frank Webster — Blgelow 4-6370

BEND

PUNCH

DIMPLE

Automatic—entire airfoil ground in one operation, both leading and trailing edges; grinds all irregular and twisted airfoil sections; accuracy held to .003"; uniform performance; minimum scrap loss; ease of operation—one loader can serve a battery of grinders, etc., are explained in an illustrated brochure in color recently published by **Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn.**

7. New folders have been made available by the DoAll Co. describing its line of centers and toolbit collets. The "Super-Centers" have a replaceable tip of "Exmet," a new alloy used in jet engines and very tough, capable of withstanding high temperatures. Write **The DoAll Co., Des Plaines, Ill.**, requesting Bulletin 51-828 for collets and 52-802 for the centers for lathes and grinders.



Ask for this set of four Motch & Merryweather folders. Altogether, they give a pretty complete picture of cut-off blades made for fast, usable production — M & M's well known segmental type, solid blades and slitting and slotting blades. Better still, get the folders from your local Motch & Merryweather dealer.



THE MOTCH & MERRYWEATHER MACHINERY CO.

PENTON BUILDING

CLEVELAND 13, OHIO

COMMAND OUR UNPARALLELED EXPERIENCE IN CIRCULAR SAWING . . .

8. The Acheson Colloids Co., Dept. BB, Port Huron, Mich., manufacturer of "dag" colloidal graphite dispersions, and a division of Acheson Industries, Inc., has released Bulletin No. 435, a six-page, two-color bulletin on "Colloidal Graphite for Surface Coatings and Impregnation."

Electric furnace graphite of high purity, when rendered colloidal and dispersed in a suitable carrier, is con-

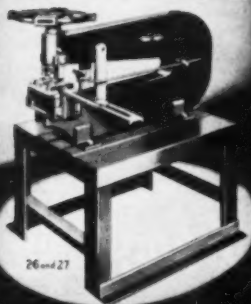
tinually finding new uses as a dry-film lubricant.

9. A 12-page bulletin (1458-52) describing the production model 1458-A Michigan Ultra Speed gear hobbing machine is ready for distribution by the Michigan Tool Co. Included in the illustrated folder are complete design and operating descriptions, tooling layouts for hydraulic clamping and general machine specifications. Write

WHITNEY METAL

TOOL COMPANY

41 YEARS EXPERIENCE



WHITNEY-JENSEN

Nos. 26 - 27

PUNCHES

The ball-bearing screw press principle is here applied to a large, hand-operated punch mounted on a sturdy floor stand. Full throat depth for work in sheets, with tie-plates, throat depth is decreased and capacity increased. Capacity, full throat depth, mild steel (No. 26) 2" thru 3/32"; (No. 27) 2" thru 1/16". Capacity, with tie-plates, 1/2" thru 3/8", both models. Send for our new catalog.

WHITNEY METAL TOOL COMPANY

115 FORBES STREET, ROCKFORD, ILLINOIS

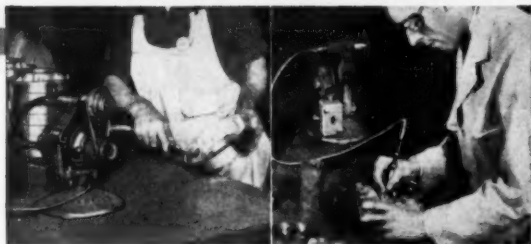
Michigan Tool Co., McNichols Road,
Detroit 12, Michigan.

10. Available to screw machine tool users and showing cams and tools for automatic screw machines, prices, various services, ordering procedures, special tools, end forming tools, standard circular form tools, cam blanks, slotting bushing blanks, circular tool blanks, and cam rollers and pins, is a new eleven page booklet being distributed

by American Cam Co., Hartford 1,
Conn.

11. Advantages and uses of the Green engraver, showing its adaptability to engraving requirements on such materials as metals, plastics, hard rubber, glass and wood and several attachments with examples of actual work together with outstanding users of the equipment, are shown in a two color brochure by the Green Instrument Co.,

RUGGED or SENSITIVE
A PRATT & WHITNEY
J-O KELLERFLEX
 FLEXIBLE SHAFT MACHINE
Does MORE Jobs BETTER



Burring, polishing, grinding and cutting; Pratt & Whitney J-O Kellerflex Flexible Shaft Machines do more work better and faster. The wide choice of handpieces, cables and tools available for use with the Model J-O adapts it to a multitude of jobs from the delicate jewelry dies and denture molds to castings of approximately 5 pounds. Chucking capacities range from 3/32" to 1/4". Motor is 1/8 h.p.; 4 machine speeds are provided — in changing it is necessary only to loosen one wing nut. Bench stand, floor stand or suspension types are available; all feature full 360° swivel mounting for maximum convenience. Send now for complete information; write on your Company letterhead for Bulletin No. 504-1.

PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY
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386 Putnam Ave., Cambridge, Mass.

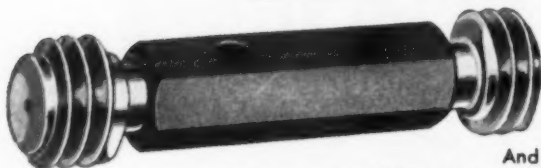
12. A new technical bulletin describing their precision tool-room vise, designed for jig borers, surface grinders, drill presses, and tappers, may be obtained by writing The Producto Machine Co., 960 Housatonic Ave., Bridgeport 1, Conn.

13. Landis Tool Co. has, available for distribution, a completely revised edition of the catalog describing 14" and 18" type "C" Universal precision grind-

ers. There are 34 illustrations and specifications in this 16 page catalog. This includes pictures of typical grinding set-ups possible with this machine. Write Landis Tool Co., Dept. BB, Waynesboro, Pa.

14. Morton Bearing Co. has a catalog just issued, No. 52, listing its standard thrust ball bearings, thrust roller bearings, radial ball bearings, roller bearings and needle bearings. They also make special bearings to meet specific

48-HOUR DELIVERY...



ON STANDARD MALE THREAD GAGES

And most standard thread plug gages are on our shelves for even faster shipment. This includes all sizes, from 0-80 NF to 1½"-6 NC, class 2 and 3, in stock.

How can Perfex maintain quantity stocks of all these popular sizes? It's simple: we've expanded our plant and facilities, added more and more fine thread grinding and checking equipment and increased our force of skilled gage-makers in order to assure you of complete service. Now we're ready to prove the quality of our work and prove it to you today, not in six weeks!

Remember Perfex for your gage needs—thread plugs, thread rings, specials from the smallest up to giants. Perfex is represented in all principal industrial areas; please write for copy of new catalog and name of the Perfex man nearest you. He's as close to you as your telephone.

Perfex also manufactures the "Tangi-Matic" angle-tangent-to-radius wheel dresser.



PERFEX GAGE & TOOL CO.

122 Avery St.

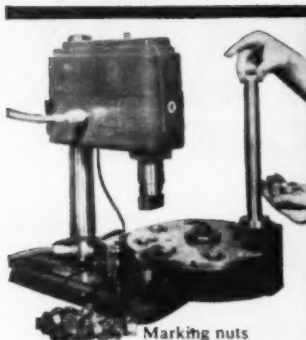
Mt. Clemens, Mich.

load requirements and space limitations. Morton Bearing Co., 200 Hill St., Ann Arbor, Mich.

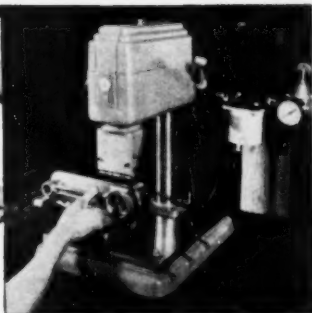
15. A 24-page booklet just published tells the story of the Malcomizing process for surface hardening stainless steels. The copy plus 26 illustrations and tables tell what the process is, what it does, and how it works. Seven case histories show results of Malcomized steel. Free copy obtainable by writing

Lindberg Steel Treating Co., 222 N. Laflin, Chicago, Ill.

16. Besley Wells is offering a tap manual which includes the latest information on taps for British-American unified threads. The bulletin also contains data on tap-drill sizes, selection of taps for various classes of work and kinds of material feeds, speeds, how to sharpen taps, types of coolants and screw thread terms and definitions. Requests should be on a letterhead ad-



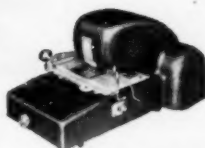
Marking nuts



Marking connecting rods and caps

Mark More Parts per Minute

Whether your problem is the marking of nuts, bolts, connecting rods, axles, pots and pans or the branding of screw drivers, pencils, baseballs or ammunition belts—it will pay you to investigate the Automark. This automatic high-speed pneumatic marking machine needs no special jigs or fixtures for average work. Where holding devices are required several standard automatic fixtures are available. We'll gladly design and build special equipment. Write for Bulletin 712.



NEW Electric Typewriter marks metal name plates in one-fifth the time.

AUTOMARK Automatic Marking **MACHINE**

Manufactured Exclusively By

DEFIANCE MACHINE & TOOL COMPANY

1922 South Vandeventer Ave. • St. Louis 10, Mo.

AGENTS

Desirable territories open for responsible representatives. Write giving complete information, lines carried and territory covered.

dressed to Besley-Welles Corp., Dept. BB, Beloit, Wis.

17. Two new leaflets in the dual series of management and technical aids to small business were announced today by the Small Defense Plants Administration.

The leaflets, "Sharpening Certain Metal-Cutting Tools in Machine Shops," and "Business Insurance—I," are the fourth to be issued in each of the two

series by SDPA's management service division. Copies are available upon request from any of the 15 SDPA field offices or from the national office in Washington.

18. A new 6-page folder listing quantity net prices for Colonial ASA standard drill jig bushings is available from Colonial Bushings, Inc., Dept. BB, 31780 Groesbeck Highway, Fraser, Mich.

The list, which is a companion piece

There's a reason **71%**

of all popularly-priced Tool and Cutter Grinders
sold in 1951 were "Knock-Outs"

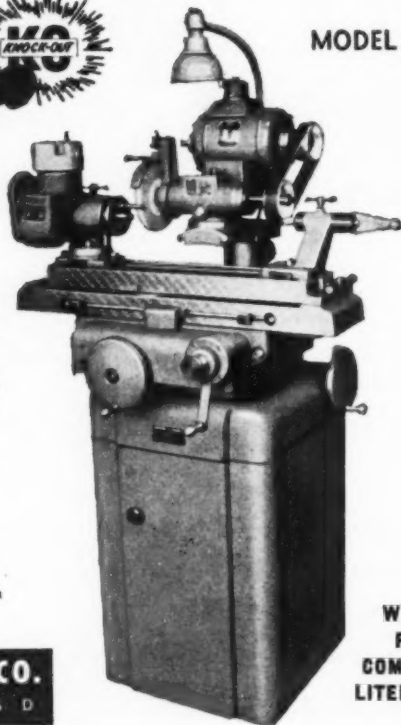


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anything that
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costing 2 or 3
times more
will do . . .
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Only Through
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WRITE
FOR
COMPLETE
LITERATURE

to the company's "flip-a-page" catalog B-649, covers prices of all fixed renewable, slip renewable and head press fit jig bushings. Prices for headless, headless press fit, and head type liners are also included.

19. A new color folder titled "Engraving Machine and Accessories" will be mailed to all who write for it. Ask for Bulletin B-1. H. P. Preis Engraving Machine Co., 163 Industrial Branch, Hillside, N. J.

20. Danly Machine Specialites, Inc., 2100 S. Laramie Ave., Dept. BB, Chicago 50, Ill., has announced availability of a new 12 page catalog on the complete Danly line of quick-acting toggle clamps, marketed under the trade name "Kwik-Klamps." The clamps are used in all types of work-holding and fixturing operations.

21. The 2000 lb. model hydraulic sheet feeding tables manufactured by The Raymond Corp., 3794 Madison St.,

SAVE 3 WAYS

WITH



CHECK THESE PRICES

Furnace Size	2000'	2300'
6x 8x12"	\$ 467.00	\$ 548.00
9x 9x18"	647.50	764.00
12x12x24"	912.00	1068.00
18x18x36"	1419.75	1629.50

Complete with 100% automatic electronic controls.

WRITE for FREE literature, specifications and price list of Lucifer Furnaces in wide range of sizes—top loading & side loading types. Engineering service and advice without obligation.

Write, wire or telephone TODAY.

GILBERT S. SIMONSKI COMPANY

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1 SAVE with a Lucifer Electric Furnace on **FIRST COST**. Our straight line production permits economical selling price, despite use of highest quality materials throughout. Check costs on other furnaces . . . feature by feature . . . you'll save money on the Lucifer Electric Furnace **EVERY TIME**.

2 SAVE ON MAN HOURS with a Lucifer Electric Furnace. Less operator attention needed because Lucifer controls are **EXACT**. They reach **SPECIFIED** heat rapidly and retain **SPECIFIED** temperature without variation. No special experience required when you use a Lucifer.

3 SAVE on maintenance expense with a Lucifer Electric Furnace! Finest refractory materials are built into Lucifer Furnaces for better, more efficient heat retention. Elements are guaranteed long lived trouble free. You save three ways with a Lucifer Electric Furnace, whether used for production or laboratory purpose. More than two thousand satisfied users.

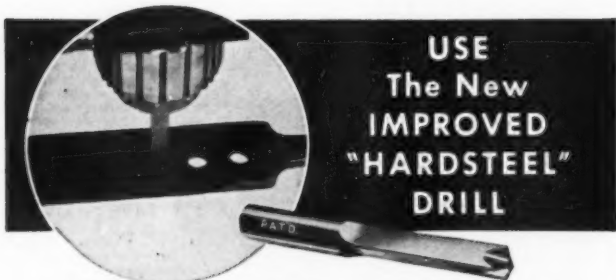
Greene, N. Y., formerly Lyon-Raymond Corp., are illustrated and described in Bulletin No. 262. It describes how the use of the equipment will simplify work, reduce worker fatigue, increase production, cut handling costs and eliminate hazards.

22. The new Southco handbook of fastening specialties (catalog B-2) contains 22 pages of information on industrial fasteners for metal-to-metal and metal-to-wood applications. Blind rivets

and a variety of door latching and fastening devices are illustrated in this two color, spiral bound book. Write Southco Div., Dept. BB, South Chester Corp., Lester Pa.

23. Three specification booklets showing detailed information on the new Gar Wood 3/4 yard, Models 75A and 75B excavators and the 75BT truck crane have been announced by Gar Wood Industries, Inc., Dept. BB, Wayne, Mich. Additional information on power plants;

Drill Hardened Steels without Annealing —



With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counter-boring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon—high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

**You Harden It—We'll Drill It—
With "HARDSTEEL"**

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Also makers of—
BLACK DRILLING
UNITS—AUTOMATIC,
SELF-CONTAINED—
FOR COST-CUTTING
PRODUCTION ON
ALL MATERIALS

Write for information

the right angle drive, the most efficient method of power transmission; travel speeds and controls are contained in this manual to help contractors select the right unit for their job.

24. The Raymond Corp., 3795 Madison St., Greene, N. Y., formerly Lyon-Raymond Corp., wants every metal-working plant to have a copy of Bulletin No. 263, which describes some of their 10,000 lb. and 20,000 lb. hydraulic elevating sheet feeding tables.

This new bulletin suggests applications, describes the models, lists specifications and shows on-the-job installations.

25. Seven types of X-ray equipment made by Westinghouse Electric Corp. Dept. BB, Pittsburgh, Pa., for industrial application are described in a four-page folder, "Seven Industrial Eyes." The folder contains pictures of each type of X-ray equipment with a brief description of how each is used.

Series 2500
9-inch mill
with 12 blades



The Gairing

E-CON-O-MILL STANDARD FACE MILLS

OFFERED IN 3 LINES

To economize . . . standardize on E-Con-O-Mill. First made five years ago, these sturdy mills not only proved themselves tools of truly one-piece rigidity, but have effected important savings on these points:

They Cut Down Tool Inventory. One size of tungsten-carbide blade fits bodies of all sizes. And, by changing blades, all mills can be equipped for cutting steel, cast iron and nonferrous.

They Save On Grinding Costs. New blades come finish-ground, ready for work. It takes no great skill to re-sharpen them individually to a gage on a carbide grinder. Or, if you prefer, the cutter can be re-sharpened on a cutter grinder.

They Reduce Machine Down-Time. Blades are changed easily, may be replaced by new or re-sharpened blades without taking the cutter from the machine.

AVAILABLE FROM STOCK FOR IMMEDIATE DELIVERY. All sizes of right- and left-hand mills, Series 2500, are stocked for National Standard Arbor and National Standard Drive. Series 4500 and 6500 are available on short order.



Series 2500 cone-type mills in sizes from 5 to 16-inch dia. (Eight-inch mill has 8 or 10 blades)



Series 4500 with heavier bodies in sizes from 8 to 16-inch dia. (Eight-inch mill has 10 or 12 blades)



Series 6500 cone-type mills with greater number of blades, sizes 8 to 14 inch, specially recommended for cutting cast iron. (8-inch mill has 16 blades)

The GAIRING TOOL COMPANY, Box 478, Detroit 32, Michigan

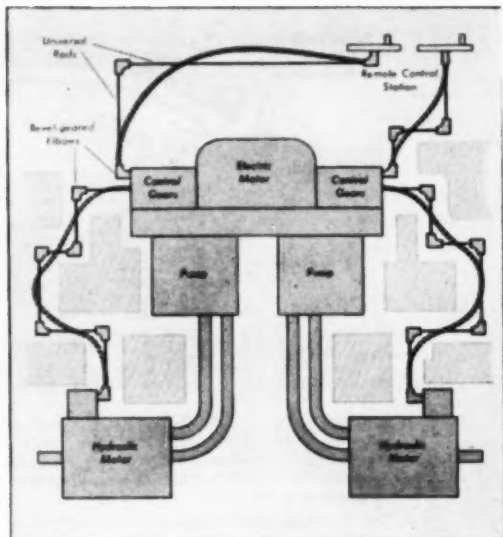
26. A new bulletin on engineered structural shapes has just been issued by Kling Bros. Engineering Works, 1323 N. Kostner Ave., Chicago 51, Ill.

These shapes consist of rolled or formed angles, beams, channels, bars or rails of steel, aluminum or brass which are used to replace casting or plate cutting methods formerly used.

27. The features and advantages of granite surface plates for precision measuring and gaging operations are

listed and discussed in a data sheet recently published by The DoAll Co., Dept. BB, Des Plaines, Ill. The features include a harder-than-glass and non-lapping surface that resists the imbedding of dust and abrasives, non-rusting and non-magnetic characteristics and freedom from warpage.

28. A new bulletin on the subject of Kling double angle shears has just been issued by Kling Bros. Engineering Works, 1323 N. Kostner Ave., Chicago 51, Ill.



In the electrically-operated hydraulic power system, shown in the diagram above, 17 universal rods and 18 bevel gears were used to carry control from a remote point to the hydraulic motors. This set-up was both costly and troublesome from the standpoint of manufacturing, assembly and operation. S.S.White engineers went to work on the problem and recommended the use of four standard S.S.White flexible

shafts to replace the rods and elbows. The result—a 100% improved application and a vastly superior and more sensitive control set-up—at 1/10th the cost.

S.S.White engineers are ready to cooperate with you in working out any power drive or control problem. Take advantage of their advice and experience—there's no obligation.

260-PAGE FLEXIBLE SHAFT HANDBOOK sent free if requested on your letterhead.



THE S.S.White INDUSTRIAL DIVISION
DENTAL MFG. CO.



Dept. H, 10 East 40th St.
 NEW YORK 16, N. Y.

WESTERN DISTRICT OFFICE: Times Building, Long Beach, California

Shop HINTS



Jig for center drilling forgings

by Tom Brown

One part of an automobile drive shaft consists of a universal coupling element which is delivered to the machine shop in a forged condition and in the shape shown at **A** in the drawing. The initial operation on the forging consists of drilling two center holes **B** from which the subsequent machining operations are located.

If the centers are not positioned correctly in the forging it is possible that the components will be scrapped during subsequent machining operations. The machining allowance on the forgings in their rough state does not exceed a depth of $3/32$ in. at any part, and it is therefore essential that the jig for drilling the center holes shall share out the material available in a balanced manner. Correct balance of material on either side of the component center line is also of importance since any excessive dynamic unbalance on a part which rotates at high speed, as this one does, will cause vibration and noise in the finished vehicle.

The universal coupling element is a common engineering component which is used in a wide range of machine construction, apart from automobiles; therefore, a description of the roll-over drill jig which has been used successfully for centering such parts should be of general interest.

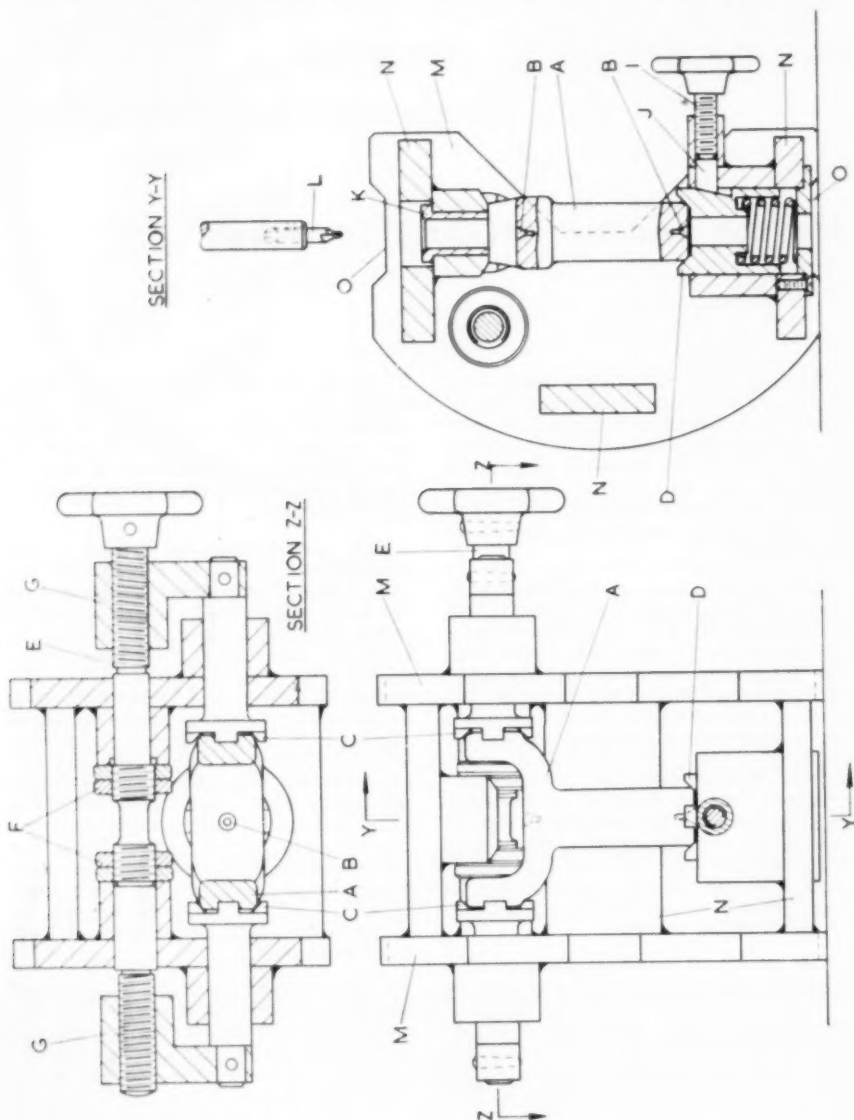
The jig is of welded steel construction which offers the advantages of light weight and high strength, both of which are necessary in a jig which must be turned over many hundreds of times a day in a high production shop by semi-skilled operators.

The centers must be drilled in the component in correct relation to the center line intersecting the centers of the forks and to the axis of the parallel shank. In consequence, the component is located in the jig at three points only; on the bosses, on the forks, and on the end of the shank. The locators all work on the same principle and have combined clamping and centralizing features, which are obtained by means of a conical recess which is gashed across so that the remaining material forms jaws which can get a grip on the material. The locators which engage with the small bosses on the ends of the component arms are at **C** and the locator for the shank end is at **D**. All the locators derive their clamping action from axial pressure.

It can be seen from the section **Z-Z** that the two fork locators **C** are moved toward or away from the component under the action of the handwheel-operated screw **E**. This screw has a right hand thread at one end and a left hand thread at the other and is held in

an accurate axial position by means of the nuts **F**. Rotation of the screw thus causes the nuts **G** to move together or away from each other in unison. At

any position on the screw, the nuts are always at equal distance either side of the vertical center line of the jig. The nuts are pinned to the work locators so



that these move with them and automatically centralize the components which they grip under pressure from the screw. The nuts **F** can be used to adjust the axial position of the screw in relation to the jig center line so that adjustments for wear of the locators may be made during the life of the jig. Also, the nuts are used for taking up any endwise slack in the screw.

The lower locator **D** incorporates a guide bush for the shank holding the center drill and is spring loaded so that it is urged upwards against the shank end face on the component. It can be seen from section **Y-Y** that the bore **H** for guiding the center drill is close to the shank on the work. When the component is to be loaded into the jig, the operator thrusts the end of the shank into locator **D** and thrusts downward in order to compress the spring. The screw for the fork locators is rotated so that these are tightened on to the component. Since the shank end locator is already in the correct position because of its compression spring, it is only necessary to lock this locator

against movement during the drilling operation.

Locking of the locator is accomplished by means of the knob-actuated screw **I** which forces a plug **J** into contact with an angular flat machined on the locator body, thus eliminating any chance of downward movement of the locator.

For centering the fork end of the component, a normal pressed-in drill guide bushing **K** is used. The center drill **L** is mounted in the end of a hardened and ground shank which is a close running fit in the two guide bushings on the jig. The shank has to be of a fairly considerable length in order to reach down to the component through the long bushings; but since the bushings are close to the work, the drill is supported adequately when in use.

Construction of the jig body is fairly simple and comprises two end plates **M** which are radiused at the back to allow the jig to rock over easily when reversing it end-for-end. These stretcher plates **N** are welded between the end plates and two of these have welded-on



**Sensitive
Universal**

BENCH or FLOOR TYPE RADIAL DRILL

1/2" Drill, cap. speeds up to 3600 RPM
Dist. Spindle to column—21"
Dist. chuck to base—16 1/2"
Precision Spindle, Ball Bearing Mounted
Rugged Construction, Weight 700 lbs.
Complete Spare Parts Inventory

NO PRIORITIES NECESSARY

Dealers' Inquiries Invited

Write for free illustrated catalogue

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NEW YORK 12, N. Y.



housings for the drill guide bushings. The upper and lower ends O of the end plates are sawn out so that feet are formed for the jig to stand on without rocking and to reduce the area in contact with the drilling machine table so that the tendency for swarf to be trapped under the feet is reduced.

The End

Improved device for lifting thru holes

by H. G. Frommer

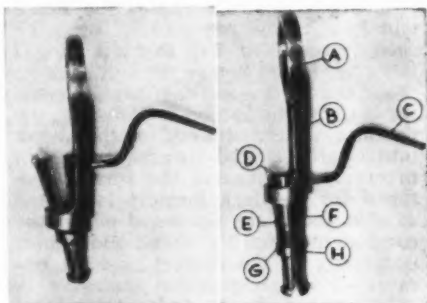
In the January, 1952, issue, on these pages, I reported a simple lifting device for the lifting of odd-shaped parts by use of a hole within the part. This hole may be incidental, or it could be provided expressly for that purpose, especially if the work piece is awkward to handle otherwise.

Figure 1 shows an improved lifting device in unengaged position, while figure 2 indicates the spreading action

which results as the hoist hook pulls up ring A. This ring is but a short piece of large pipe. Body B, too, is

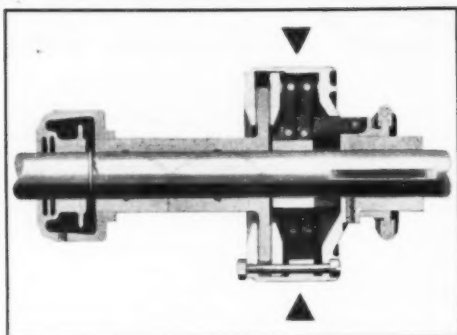
1. **The special lifting device** before insertion. Operator grasps handle only.

2. **After insertion**, lowest diameter of spreader halves is larger than the hole of the work piece. Lifting device is ready for the hoist hook. Hole of casting on which this device is used is tapered, the larger end being at the top surface.



"20 YEARS HARD LABOR"

That's the length of service rendered by many of our clutches. It is sturdy, reliable, and free from troubles, proven by years of application. Available with automatic Ring-Oiling Sleeve. Actuated by simple Anti-Friction Roller Toggles that require no lubrication, but which produce powerful engaging forces, on dual, lagged, friction surfaces. This means faithful, unfaltering service, even with frequent engagements.



WRITE FOR BULLETIN No. 25B

BROWN ENGINEERING CO.
126 N. THIRD ST. READING, PA.

made of pipe, part of which is cut away. Spreader halves E and F, made of one piece which is turned on a lathe, as shown, is drilled for a hinge pin H. Then, the piece is split on a band saw and a small wedge-shaped section near the bottom end is removed. Also a hole for handle C is drilled into spreader half F.

Pin H is brazed to spreader half E, spring ring G is slipped over both halves to hold them together and the spreader assembly is then inserted through body B. To prevent disassembly and to provide easy gripping, handle C is pressed into the hole within F. A small counterweight D was necessary to effect the opening up of spreader halves as shown in figure 1 to ease insertion through the hole of the work piece.

In operation, the operator grasps handle C and drops spreader thru hole of work. As the lower edge of the body B hits the upper surface of work and as

the operator continues to force C downward, the spreader halves open at the lower ends until the lowest part of them is larger than the hole of the work piece. Then, the operator transfers his grasp to the ring A, pulls up on it and inserts hoist hook thru it. The pull of the hoist then prevents the spreader's collapse and an extremely safe lift is effected.

Use discarded power hack saw blades

Discarded power hack saw blades now are being used at Temco Aircraft Corp., Dallas, Tex., to trim sanding discs to the exact size of backing plates. The result is a 50 percent saving in man hours and a considerable reduction in tool costs.

W. R. Lee, small tool repair employee, developed the process in an effort to improve the general industry practice of filing the discs to size with a wood

OVER 1500 NOW IN USE!

ABA Precision Surface Grinder

WITH HYDRAULIC TABLE FEED
AND ADDITIONAL HAND FEED

Where highest precision is required the ABA Precision Surface Grinder meets every test. With the aid of divided heads, sine plates, and other attachments it can handle the heaviest and most difficult jobs. Complete hydraulic table feed as well as manual operation make this grinder doubly practical. The use of ball bearings means extremely easy handling of all hand wheels and operating levers.

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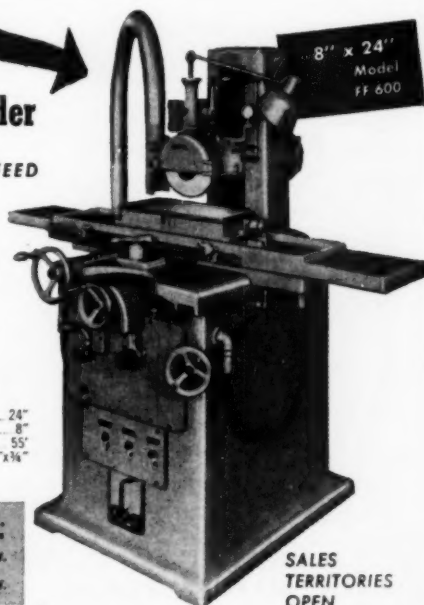
PARTIAL SPECIFICATIONS

Max. length of grinding area	24"
Max. width of grinding area	8"
Long. table speed, infinitely variable FPM	55'
Grinding wheel	8"x1 1/4"

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SALES
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rasp, which produced rough edges and wore out from two to three rasps each week.

Lee sharpened the edge of a discarded power hack saw blade, wrapped the

ends with tape for handles, and used the tool as a draw knife to trim the discs. This process performed the operation in half the usual time, left neater edges and completely eliminated not only the using up of rasps, but also the wear on the backing plates which had resulted from the former method.

Peening ends of screws or bolts

A simple tool for peening ends of screws or bolts at three or more points with one blow of a hammer has been devised by Kenneth Klug, an Allis-Chalmers employee.

Assembly of certain blanking and stripping dies required the hand peening of up to 30 to 40 flush ends of screws to prevent them from turning during die operation. This was formerly done with a single point punch.

The hard steel tool has three points and cuts peening time 50 to 80 percent. When placed over the end of the screw,



Look for this tool chest display at your dealers.

Sold by leading Mill supply and hardware dealers. If your dealer cannot supply send order with name of dealer or write for bulletin No. 752 showing each item in use.

CULLEN MANUFACTURING CO.
RACINE WISCONSIN

A COMPLETE LINE OF MAGNETIC BASE UNITS AND ACCESSORIES

No. 100—Erick Magna Holder for Indicators—\$3.95

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No. 300—Erick Magna Holder for Indicators up to 3" in diameter for use as lathe stops—\$2.95

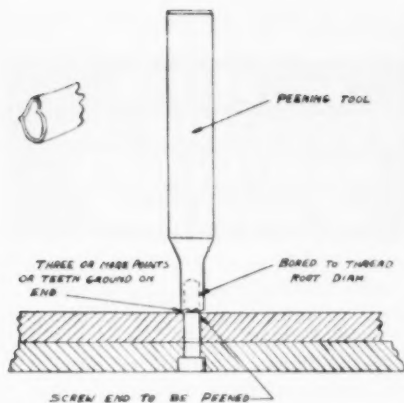
No. 400—Erick Safety Shield 5" x 7" plexiglass. Also 8" x 10" size for use with Model 100 or 200 Erick Magna Holder—\$3.50 & \$4.25

No. 600—Erick Magna Holder Inspection Light—25 Watt Bulb—\$6.50

No. 700—Erick Magna Holder for Flashlights and drop cord lights—\$3.50

No. 800—Erick 4X Magnifying Glass for use with Model 100 or 200 Erick Magna-Holder—\$4.25

TENS OF THOUSANDS of these fine units now in use have proven themselves under actual shop conditions and are heartily endorsed by machine shop personnel in all types of industry! Magnetic base units are constructed with powerful lifetime Alnico magnets. All materials and workmanship unconditionally guaranteed.

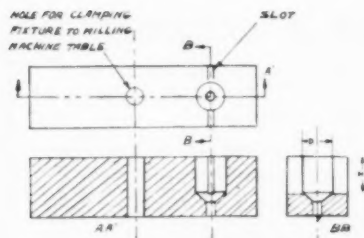


which protrudes slightly from the metal surface, the tool is struck with a hammer. It leaves three neatly spaced indentations in the material around the screw, which permanently lock it in place.

Fixture eliminates filing

A milling machine fixture for use in cutting cylindrical pieces in half devised by Louis De Laura, Allis-Chalmers employe, has eliminated a filing operation.

MILLING MACHINE FIXTURE FOR CUTTING CYLINDRICAL PIECE IN HALF



D— HOLE DRILLED A FEW THOUSANTHS LARGER THAN DIAMETER OF PIECE.

H— HOLE DEPTH IS SUCH THAT PIECE WILL PROTRUDE FROM TOP OF BAR ABOUT $\frac{1}{16}$ "



CMD LUBRICANTS

PAY OFF in higher production

...Because they have better anti-scoring qualities to work under extreme pressures.

Use CMD on your lathe centers, die set leader pins, steady rests, machine ways, cams, broaches, thrust bearings, taps and dies, to name a few. In fact, CMD lubricants work every day under pressures of 40,000 to 50,000 pounds per square inch in thousands of plants from coast to coast.



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36 IN. THROAT
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CAPACITY

CIRCLE
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Included as
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**for BETTER
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A proved time-saver in any sized shop. Libert's *flexibility* gives you a wider variety of work—clean shearing of flat or formed sheet metal... straight or irregular shapes... inside or outside cuts. Libert *simplicity* means that even unskilled labor soon does accurate work, lots of it *and fast!*

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Made in sizes up to 60 in. throat, 10 gauge capacity

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**OPEN BACK INCLINABLE
PUNCH PRESSES**

Soundly Engineered — Ruggedly Built for

PRECISION & ECONOMY

- All bearings honed to exact sizes, guaranteeing perfect fit and alignment.
- Matched unit slide and gibs pre-finished by precision lapping with newly developed process.
- Chrome molybdenum cranks, wrist pin connections.
- Easy to maintain — economical to operate.
- 5 to 70 tons capacity.
- 9 models.

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literature

ation and has made for greater accuracy and speed.

The fixture is used to cut in half round bars 3/4 inch in diameter and one inch long so as to form semi-circular cross sections of close tolerance. The piece to be milled protrudes from the top of the steel fixture and is clamped from the top so that a narrow milling cutter can completely cut it in half through the slot in the back.


Prior to using the fixture, the pieces had to be filed before and after milling because of center lumps left by the lathe.



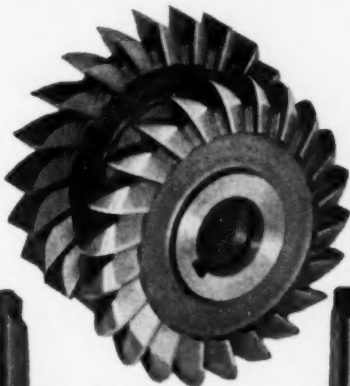
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Made in a range of sizes and types, to handle most any kind of machining operation, where vises are applicable. Write for circular, etc.
J. E. Martin Mach. Works, Springfield, O.



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 SAVE TOOLS**
 For rapid changeover of Tool
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SPECIAL TOOLS FROM STANDARD TOOLS

All types of special reamers, cutters, end mills and drills can be made from standard catalog tools. We can make these specials to your blueprints quickly and economically from our large stock of standard cutting tools.

Mail your specifications or blueprints today for immediate price and delivery.



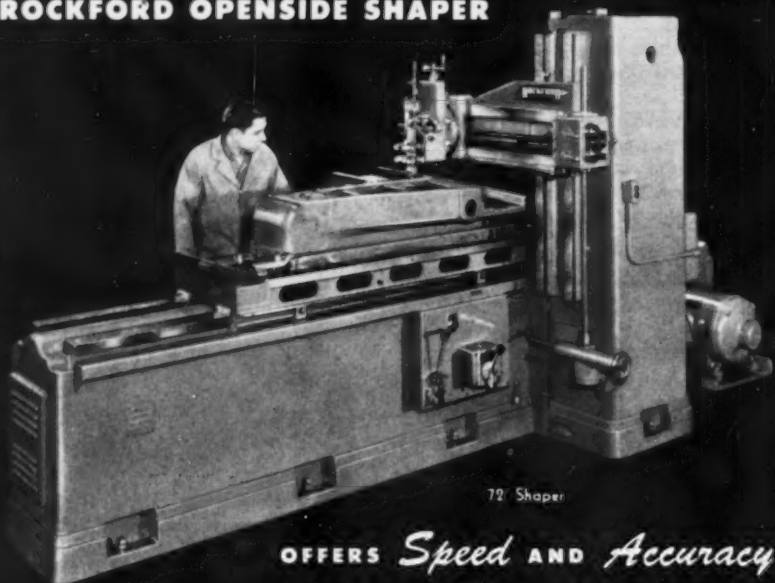
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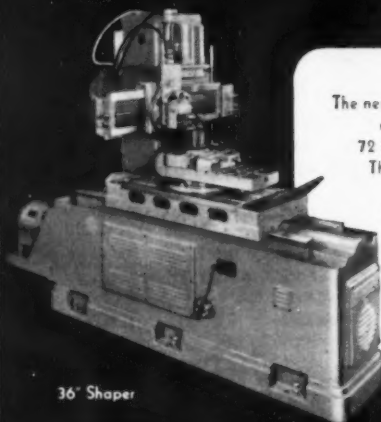
NEW.....

ROCKFORD OPENSIDE SHAPER



72" Shaper

OFFERS *Speed AND Accuracy*
PLUS *Versatility*



36" Shaper

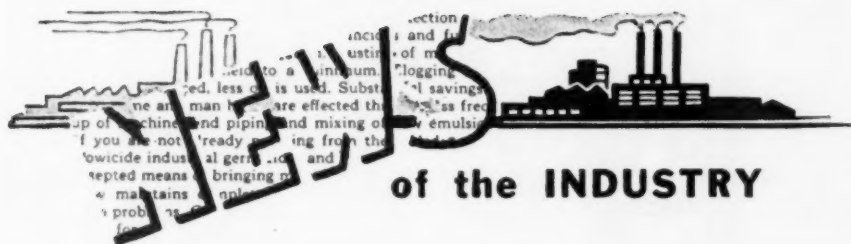
Hy-Draulic

The new 72" Rockford Openside Shaper gives you best results on all shaper jobs — with stroke lengths up to 72 inches

This "big brother" of the Rockford Openside Shaper family (36", 48", 60", 72") has all the superior features of companion models, *plus* increased capacity. It's the maximum in versatility — large-job capacity with no sacrifice in speed or accuracy. And it's *Hydraulic*... of course.

Before you invest, investigate the new 72" Rockford Openside.

ROCKFORD MACHINE TOOL CO.
2500 Kishwaukee Street • Rockford, Illinois



The Gatco Rotary Bushing Co. has now moved to the new plant at 42330 Ann Arbor Road, U.S. 12, Plymouth, Mich. Formerly it was located at 1300 Mt. Elliott Ave., Detroit, Mich. Production facilities are now increased over 100%.

This company was established by J. P. Giern and A. P. Anholtt in 1913. They are known as the originators of the rotary jig and pilot bushing, and have served the automotive and allied industries for years.

Mr. A. W. Payne's retirement as chairman of the board of directors of Crane

The appointment of **E. G. "Bud" Brown, Jr.**, as a sales representative has been announced by **J. H. Williams & Co.**, Buffalo, N. Y., manufacturers of industrial and automotive tools and drop-forgings.

In his new capacity Mr. Brown will assist **J. J. McCann**, Philadelphia district manager.

Mr. Brown has been associated with Williams in the export division at the Buffalo office since January, 1946.



Karl V. Rohlen



E. G. Brown, Jr.

Packing Co., Chicago, after more than 30 years' active participation, has been

Talide

(TUNGSTEN CARBIDE)

**MEETS
EVERY REQUIREMENT**



DIES



BLADES



BUSHINGS

For the past twenty-five years actual operating records have proven the advantages of Talide tools, dies, blades, bushings, rolls and other tungsten carbide products.

On most cutting, drawing, rolling and wear-resistant applications, you can triple your production and cut costs in half. Extra long runs make Talide Metal less expensive than steel.

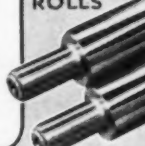
Send us parts or prints and we will show you how this hardest man-made metal can help you secure more production from your present equipment. Write for Catalog 50-G or ask for a Talide sales engineer to call.



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TOOLS



ROLLS



METAL CARBIDES CORPORATION

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SINTERED CARBIDES—HOT PRESSED CARBIDES

announced by the Board of Directors. **Frank E. Payne**, formerly president of the company, was elected chairman of the board and **Karl V. Rohlen** succeeded to the presidency from his former position of vice-president and general manager.

George H. Sanborn, Detroit district manager and chief field engineer, was named sales manager to succeed **Leroy C. King**, who retired after 41 years in

service and sales work for The Fellows Gear Shaper Co.

Henry B. Flinn, assistant publicity manager, was appointed publicity manager, succeeding **Douglas T. Hamilton** who retired after serving 35 years in that capacity.

Lester D. Chirgwin, vice president of Farrel-Birmingham Co., Inc., Ansonia, Conn., has been elected president of Consolidated Machine Tool Corp.,

Rochester, N. Y., a subsidiary acquired by Farrel-Birmingham in 1951.

He succeeds Arthur H. Ingle, who has been president of Consolidated since

O'Connor as vice president and manager of new product development and Robert F. Dick as vice president and assistant to the president. Eugene W.



L. C. King



G. H. Sanborn



Lester D. Chirgwin



D. T. Hamilton

1924. Mr. Ingle will remain on the board of directors of both Consolidated and Farrel-Birmingham and continue as corporation consultant.

Harold Byron Smith, president of Illinois Tool Works, Chicago, has announced the election of Austin E. Cole as vice president and treasurer, J. B.

Fuller will continue as vice president and manager of Shakeproof Inc., a division of Illinois Tool Works. J. F. Miller remains vice president and manager of the Tool and Machine Division.

Bruce F. Olson, President of Sundstrand Machine Tool Co., Rockford, Ill., has announced the appointment of

**SHALLOW HOLES...DEEP HOLES
DRILL THEM *FASTER,*
ALL *BETTER***

**WITH A
*Commander***

DRILL CHIP BREAKER

- ✓ Small Chips Permit 50%—400% Increase in Drilling Speeds
- ✓ Drill 10 Diameters or More in Depth Without Clearing Drill
- ✓ Better, Smoother, More Accurate Holes

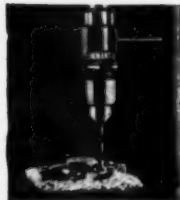
Reciprocating action of the Commander Drill Chip Breaker breaks chips into small pieces that travel up drill flutes . . . permitting higher drilling speeds . . . doubles and triples production of shallow OR deep holes. Long chips which cause drill breakage, scored holes, slow jig and fixture loading, are eliminated—small, easy to handle chips flow up out of hole continuously, permitting coolant to reach cutting edge of drill. Assures longer drill life, more holes per sharpening, more holes per hour. Your nearby **COMMANDER** Distributor has the Drill Chip Breaker and other Commander Production Tools.

***Commander* MFG. CO.**

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Ordinary Chips



Chip Breaker Chips

**Write FOR
CATALOG #851**
which describes Commander's
Production Tools

B. A. Gustafson, manager of the machine tool division, as vice president of the company. Mr. Gustafson has been associated with the company since

ment Corp., 608 Fifth Avenue, New York, N. Y., has been appointed U. S. representative of Canada Machinery Corp. Limited, Galt, Canada, well-known



Robert F. Dick



Austin E. Cole



B. A. Gustafson



Edgar O. Landstrom

1933. Mr. Olson also announced the appointment of **Edgar O. Landstrom** as secretary of the company. Mr. Landstrom was formerly manager of the pneumatic products division.

Pitnam Industrial Products Co., division of Cement and General Develop-

manufacturer of lathes (including turret lathes available for short delivery), shapers, slotters, bolt cutters and various special purpose machines. Pitnam is now in the process of appointing dealers to cover the major industrial areas of the country.

Finished **PIPE NOTCHING IN 5 SECONDS OR LESS**

ARC-FIT actually notches out pipe or tube ends in less than 5 seconds to give you snug-fitting "T" or angle joints, ready for welding or brazing, without deformation or any extra finishing.

Standard ARC-FITS for "T" joints using single size standard pipe from 3/4" to 2" shipped promptly from stock.

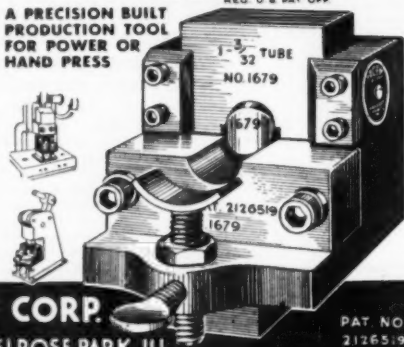
Special ARC-FITS for larger sizes or angular cuts supplied to your specifications... Quick-interchangeable punches and dies also available. Send us drawing of joint and material specifications for quotation and full information.

ARC-FIT IS PRICED SO THAT EVEN THE SMALLEST SHOP CAN AFFORD IT

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with **ARC-FIT**

A PRECISION BUILT
PRODUCTION TOOL
FOR POWER OR
HAND PRESS



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1825 N. 42nd AVE., MELROSE PARK, ILL.

PAT NO.
2126519

King passes half-century

"King Machine Tool" of Cincinnati, Ohio, manufacturers of King vertical boring & turning machines, celebrates its Golden anniversary this year.

Founded by Rufus King in 1901, the business was originally incorporated as the Wais-King Tool Co. Three years later, when E. A. Muller joined the organization as vice-president and general manager, the corporate name was changed to The King Machine Tool Co., and so remained for the succeeding forty-four years—until 1948, when the business was acquired by American Steel Foundries.

Today, King vertical boring & turning machines are widely used and uni-



versally recognized as basic tools of the metal-working industry. Today King manufactures a complete range of 10 sizes—30", 36", 42", 52", 62", 72", 84", 100", 120", 144".

The appointment of Carl S. Abbott as vice president and general manager and John W. Fauver as vice president and sales manager of the J. N. Fauver Co.,

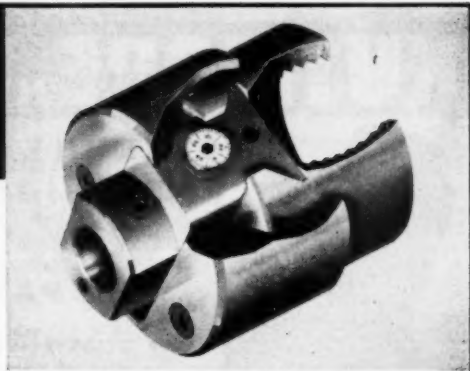
SAMSON Offset BORING CHUCKS

THESE JOB-PROVEN FEATURES WILL
SAVE YOU TIME AND MONEY

- Quick tool change
- Positive dead-centering
- Precision offset adjustment
- Rugged tool support
- Safety round contour

Complete Boring Chuck
Accessories Available

WRITE FOR COMPLETE DETAILS



FAMOUS
LAST WORD
WHEEL
DRESSER



LAST WORD SALES CO. • 18500 Mt. Elliott • Detroit 34, Mich.

Inc., 49 West Hancock, Detroit 1, Mich., has just been announced by J. N. Fau-



John W. Fauver



Carl S. Abbott

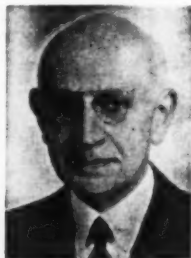
ver, president of the company. Mr. Abbott, who graduated from the University of Michigan with a degree in Mechanical Engineering, has a background of fourteen years' experience with the organization. Mr. Fauver, also a graduate of the University of Michigan engineering school, has been with

the Fauver Company seven years.

D. G. Clark has been appointed assistant general sales manager of Firth Sterling, Inc. Mr. Clark started his as-



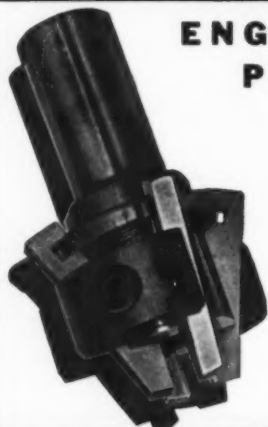
E. William Kalb



D. G. Clark

sociation with Firth Sterling in 1903 at the Chicago Branch. **E. William Kalb** has been appointed steel sales manager. His fourteen years of experience in the steel industry has covered tool steel, stainless, and alloy steel specialties.

KUTMORE ADJUSTABLE HOLLOW MILLS



ENGINEERED FOR . . . PRECISION PRODUCTION

- ANY COMBINATION OF . . . TURNING . . . TAPERING . . . FACING . . . CHAMFERING . . . TREPPANNING IN **ONE PASS.**

- EXCLUSIVE **MICROMETER** ADJUSTMENT FEATURE FOR RAPID SET-UP.
- CUTTING CAPACITIES FROM 1/32" TO 2" DIAMETER IN STANDARD STOCK. IMMEDIATE DELIVERY.

WRITE FOR CATALOGUE No. 20-BB

OUR ENGINEERING DEPARTMENT IS AT YOUR DISPOSAL ON YOUR HOLLOW MILL PROBLEMS

CARL WIRTH & SON, INC. 1625 CLINTON AVE. NO. ROCHESTER 5, N. Y.

Frank Heap, associated for 18 years with the sales and service of machine tools, has been appointed district man-



Frank Heap



W. A. Mangold

ager for a new factory-tested, water-soluble machining and grinding fluid being introduced in the Cincinnati-Dayton-Springfield area by Madison Products Co., Toledo, Ohio. The new fluid concentrate is "Trim," a product of Master Chemical Corp., Toledo.

Mr. Heap's headquarters are at 1717 Section Road, Cincinnati. For the past

nine years he was district manager in Cincinnati and Indianapolis for the Monarch Machine Tool Co. He is well known in manufacturing circles.

W. A. Mangold has been appointed general sales manager of the U. S. Drill Head Co., located at Cincinnati, Ohio. A native of Cincinnati, Mangold has spent more than 10 years with the company as sales and service engineers.

Allied Products Corp., Detroit, announces that at its annual and organizational meeting of the board of directors held in May, Ralph Hubbard, who has been president of the corporation since 1939 and a director since 1928, was advanced to chairman of the board.

Frank H. Bishop, who has been executive vice-president, was elected president as well as a director.

Prior to joining Allied in 1949, Mr. Bishop had been with General Electric Corp. for 22 years.

The internal gage that's RIGHT for war production conditions

COMTORPLUG

Gages precision bores to fractions of .0001"

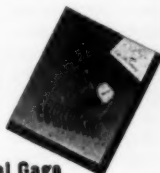
War production conditions intensify the need for a gage that gives high precision yet is Rugged, Automatically Accurate, "Unrestricted". Patented COMTORPLUG answers the need as no other gage can because:

- 1) Withstands typical shop use at machine or inspection bench, without lessening precision.
- 2) Trains equal old hands in precision results, due to automatic alignment and "feel".
- 3) For Quality Control, gives actual measurement, and a fixed, not passing—reading.
- 4) Available anywhere instantly. Weighs but a few ounces. No hose, wire, or "10-ton base".
- 5) Cost is so reasonable as to be practical for all quantity gaging applications. Fits in with other gaging methods. Let it grow as it proves itself—which it WILL!

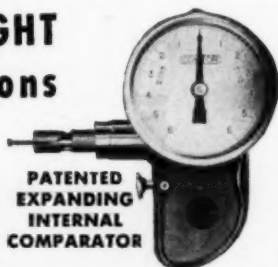
COMTOR CO.

62 Farwell St., Waltham 64, Mass.

Request
"Bulletin
46"



Request data on Comtorgage Precision External Gage



1/8" to 8" dia.



Inspection to fractional ten-thousandths of hydraulic airplane propeller distributor valve.

Deburring with **NOBUR** tool

on drill press reduces
production costs... speeds
deliveries!

MEMO

TO: Planning Dept.
FROM: Methods Engineer

NOTE: 75% saving in
time on Op. #4 and
16% in overall time.

Let's take fuller
advantage of
NOBUR

FG. CO.

OUTLINE

OPER. NO.	MACHINE	DESCRIPTION	TIME
1	TURRET	BORE & FACE PER PRINT	5 ^{MIN}
2	MILL	STRADDLE MILL PER PRINT	3
3	DRILL	10 HOLES LINE DRILL	6
4	BENCH	DE-BURR HOLES	4
4 (REV)	NOBUR TOOL IN DRILL PRESS	NOBUR HOLES	1
TOTAL			18 15

For further information, write or wire today

NOBUR MANUFACTURING COMPANY

717 NORTH VICTORY BLVD.

BURBANK, CALIFORNIA

Organization changes affecting four of the management group of Packard Motor Car Company have been announced by James J. Nance, president. Eugene C. Hoelzle, vice president, comptroller and secretary has resigned these positions and will retire; Fred J. Walters, vice president and assistant to the president has been elected vice president of marketing; LeRoy Spencer, executive vice president, has resigned that office and has been named west coast man-

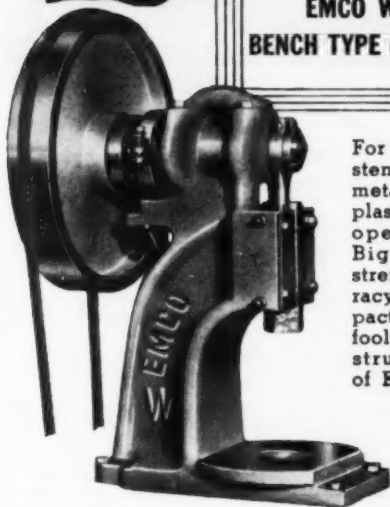
ager; and, Wilmer B. Hoge, assistant comptroller, has been promoted to comptroller.

Walter S. Schamel has been appointed district manager of the Los Angeles office for American Wheelabrator & Equipment Corp. He will open new offices at 3155 Leonis Blvd., Vernon, Los Angeles 58, on August 1, and handle the company's complete line of products, including dust collectors, abrasive

EMCO

the BIG LITTLE Press

POWER PUNCH PRESS
EMCO W • EMCO X
BENCH TYPE or STAND-MOUNTED



For punching, forming, stenciling and riveting metal, rubber, leather, plastics. Up to 18000 operations per hour. Big-machine speed, strength, rigidity, accuracy, endurance. Compact, simple in design, fool-proof; quality construction. Thousands of Emco "W" and "X" presses illustrate Klaas reliability since 1921.

Get Bulletin "B-9".

KLAAS MACHINE & MFG. COMPANY

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UNUSUAL AIDS
TO INDUSTRY

KLAAS-BUILT

blasting machines, and other foundry equipment.

A veteran of 46 years in the steel business, **William F. Jones** has been appointed manager of sales, Chicago district office of United States Steel's National Tube Div., it was announced recently by **W. J. McKee**, general manager of sales. He succeeds the late **J. S. Raymond**.

John S. Jacox has been appointed manager of purchasing for the Aviation

Gas Turbine Div. of the Westinghouse Electric Corp. at South Philadelphia, Pa. He will coordinate all purchasing activities for the division. **Wilbur C. Wilson** has been named purchasing agent for the South Philadelphia plant, and **George A. Fadler**, purchasing agent for the Kansas City plant. **H. D. Moreland** has been named manager of the X-ray division.

Malcolm Roberts has joined the Cleveland office of Kurt Orban Co., Inc., Ma-

**Directs Light Exactly as Needed
as Easily as Pointing your Finger**

FOSTORIA LOCALITES

**for Machine Tools, Assembly
and Inspection Benches**



The Finest of
All Localized
Lighting Units



MODEL 099-PX-412

Overall length 35½". Three instantly adjustable joints. Reflector accommodates 100 watt or any A-19 or A-21 medium screw base lamp.

\$13.28 EACH in pkg. of 4
Single Unit \$16.60 ea.

- **All Wiring Fully Enclosed** — completely protected from wear or insulation damage from oils and fumes
- **Adjusta-tension Joints** — tension easily adjusted for freedom of arm movement to suit worker and job
- **Universal Base** — mounts on outlet box or directly on machine or bench. Toggle switch included
- **Baked Enamel Finish** — exterior, Vista Green — Reflector interior, high temperature White



WRITE FOR COMPLETE CATALOG
of Localite models with various type reflectors, arms and bases for every industrial use.

**THE FOSTORIA PRESSED
STEEL CORPORATION
FOSTORIA, OHIO**

Localites are available through electrical wholesalers everywhere.

chine Tool Division, it was announced today by Harold W. Jones, vice-president.

Long active in machine tools, Mr. Roberts was for 10 years sole Cleveland sales engineer for New Britain Machine Co.

Frederick G. Rahe was recently appointed sales engineer for the Butterfield Div., Union Twist Drill Co., Derby Line, Vt., manufacturers of twist drills,

taps, dies, reamers and other metal cutting tools.

Appointment of **Albert J. Rosenthal** as acting general counsel of the Small Defense Plants Administration has been announced by SDPA Administrator Telford Taylor.

Mr. Rosenthal has been Associate General Counsel of SDPA. He succeeds **James M. McHaney** who has resigned to return to private law practice in Little Rock, Ark.



PRECISION ARTS by . . .



MULTIPLE SPINDLE DRILLING EQUIPT.

- Shur-Lock Adapter Assemblies (Fig. 1) • Slip Spindle Assemblies (Fig. 2) • Universal Joints (Fig. 3) • Lower Joint Assemblies (Fig. 4) • Upper Joint Assemblies (Fig. 5) • Pinion Drive Shafts (Fig. 6) • Bracket Spindle Assemblies (Fig. 7) • Arms (Fig. 8).

THANK YOU . . . For your forbearance during our move to the new plant.

We are now in position to give the kind of service you have a right to expect.

The plant is operating at a capacity which could not be attained with our former facilities.

All popular sizes of Shur-Lock Adapters now in stock, as are many cataloged spindles. Other items on a three to five weeks delivery basis.

Many advances in production methods have been made with emphasis on quality.

Our price structure affords appreciable savings.

Consult the Sales Engineers listed in the back of catalog when retooling or replacing spindles or component parts.

Prompt attention given inquiries.



Quality

& SONS, Inc.

CHENOA, ILLINOIS

A new stock-carrying branch warehouse and sales office has been established by **Quaker Rubber Corp.**, Division of **H. K. Porter Company, Inc.**, at 2201 N. Washington Ave., Minneapolis, Minn., to provide better service and deliveries to customers in the growing twin cities industrial area. The com-

pany's line includes industrial rubber products, conveyor and transmission belting, hose, packing and molded rubber products. The new warehouse has 4200 square feet of floor space designed to carry a complete inventory of industrial rubber products.

LEIMAN AIR PUMPS give you Greater Capacity!



SMALLER PISTONS

provide

LARGER AIR SPACE

Compare this cross-section of a Leiman Air Pump with any other rotary pump. It is working air space that counts — and Leiman provides 2 to 3 times more area, per size and weight of pump.

HINGED WINGS

take up their own wear

What's your air application? Leiman engineers offer over 60 years experience on thousands of air applications.

Catalog and Application Data sent on request.

For Pumps — write DEPT. A

Leiman Bros., Inc., 173 Christie St., Newark 5, N.J.

Handle your pressure, vacuum or suction jobs with much smaller Leiman Air Pumps. Save weight and space — run at lower r.p.m. — have fewer moving parts — no springs, gaskets or packing — no tips to renew — nothing to give trouble.

Metal Cleaning and Finishing without acids or scratch brushes

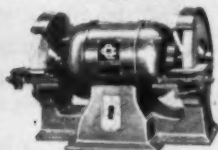
LEIMAN SANDBLASTS

Fast, low-cost, safe, uniform way to clean scaly, rusty rough surfaces — prepare for plating and finishing — stencil letters and designs — more rapid matte or satin finishes. Use unskilled help. For Sandblasts — write DEPT. B.



**OK
for**

- durability
- freedom from downtime
- low cost

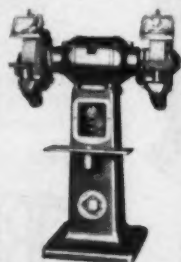


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QUEEN CITY grinders & buffers

Compare QUEEN CITY Grinders and Buffers with others costing much more . . . you'll find, as have hundreds of famous plants . . . they give extra value in long life, low maintenance and first cost. All the quality features . . . ball bearings, heavy duty motors, etc. . . . in a complete range of sizes and models. Get the facts. Write for prices and complete details.

QUEEN CITY MACHINE TOOL CO.
235 E. 2nd St. Cincinnati 2, Ohio



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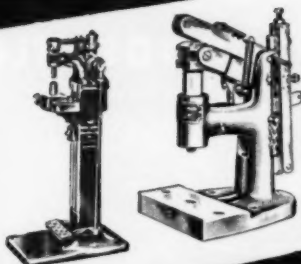


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HIGH-SPEED

COLD RIVETERS

Here's a FREE service! Send us sample assembly of your riveting work. We will study YOUR problem, and return your assembly properly riveted, with complete analysis, recommendations and quotations. It may save you time, materials and spoils—and speedup production. Why not write us?



STAKING MACHINES

Is YOUR problem DIFFERENT? Then it's our meat! We solve ANY problem in staking or riveting fixed or movable joints—in eye-letting, grommeting, burring, pointing with platinum, tungsten, silver. Cameras, meters, toys, electrical items—no matter what, we can help you! No obligation. Write us.

HIGH SPEED Hammer Co., Inc.
811 Horton St.
Rochester 21, N. Y.

Dependable MEASURING & CHECKING EQUIPMENT

and Now

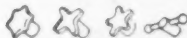
HAND WHEELS, KNOBS, HANDLES

Cadmium Plated

Non-rusting—good looking



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CAST IRON

We also build jigs, fixtures, special tools and machinery. Send us your blueprints.

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SOLID ROTARY
MACHINE HANDLES



MALLEABLE IRON



BOX PARALLELS

In 15 sizes, ranging from 3 x 4 x 12 and up.

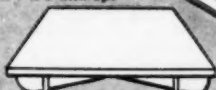
SLOTTED ANGLES

In 19 sizes, ranging from 4 x 9 x 5 and up.



UNIVERSAL ANGLES

In 10 sizes, ranging from 4 x 3 1/2 x 5 and up.



SURFACE PLATES

Over 50 sizes, ranging from 7 x 7 1/2 to 96 x 192.

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MACHINE PRODUCTS CORPORATION

6771 E. McNICHOLS ROAD

DETROIT 12, MICHIGAN

The Association of Iron & Steel Engineers states that everyone connected with the iron, steel or allied industries is eligible to attend both the technical sessions and exhibits connected with the 1952 Iron & Steel Exposition. Membership in the AISE is not required. The Exposition and AISE Convention are being held concurrently in Cleveland Public Auditorium Sept. 30 through Oct. 3. No registration fee is being charged and admission tickets are being widely distributed throughout the in-

dustry. The event is not open to the general public, however.

Lammot du Pont, former president of E. I. du Pont de Nemours & Co. and youngest of the three brothers who led the twentieth century development of the 150-year-old chemical company, died July 24. He was 71 years old.

Illness that had confined him to his Fishers Island, N. Y., summer home for

SPEED PRODUCTION



...by putting your clamping burden on

KNU-VISE AIR CLAMPS



**MODELS AVAILABLE TO GIVE YOU PRESSURES
RANGING FROM 80 LBS. UP TO 2875 LBS.**

Can bring you efficiency in several ways:

- 1** — in single installations where operator's fatigue is a factor or where the location of hand-operated clamps would be impractical.
- 2** — in multiple installation controlled by a single valve.
- 3** — in multiple installations with sequence valves operating certain clamps at predetermined intervals.

Sales offices in principal cities. Teletype DE 49

Send for new folder giving further information.

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PRODUCTS**

LAPEER MFG. CO.

3052 DAVISON ROAD • LAPEER, MICHIGAN

WESTERN DIVISION: 422 MAGNOLIA ST., GLENDALE, CALIF.

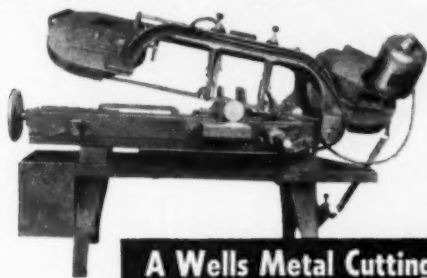
several weeks kept him from the side of his two brothers, Pierre and Irene, July 18, at the company's 150th anniversary ceremonies on the site of the original powder mill on Brandywine creek.

Lammot du Pont was the eighth member of the du Pont family and the third brother in succession to become head of the chemical company founded by Eleuthere Irenee du Pont de Nemours,

his great-grandfather, in 1802, that now has over 87,000 employees.

A new examination for chemist, engineer, mathematician, metallurgist, physicist, and electronic scientist, has been announced by the board of U. S. Civil Service Examiners for the Potomac River Naval Command, to fill positions paying from \$3,410 to \$10,800 a year in naval field establishments in Washington, D. C., and vicinity and in the en-

Are You Wasting Dollars Trying to Save Pennies On Cut-Off Jobs?



Wells No. 8
with wet cut-
ting system.



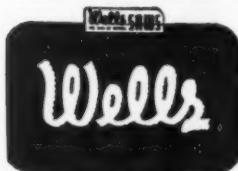
**A Wells Metal Cutting Band Saw
pays for itself in savings**

IT'S easy to fool yourself about costs on your cut-off jobs. Perhaps you say, "It doesn't amount to much, why worry about how we do it." You'd be surprised. Look at what a Wells Saw gives you—Modest first cost with a model for every budget . . . Rugged, heavy duty construction for minimum cost per year . . . Fast, continuous band saw cut-

ting . . . Accurate cutting to minimize subsequent machining . . . Simple operation that requires no special skill.

To cut your cut-off costs, ask your Wells Distributor for further information or write direct.

Standard Wells Saws: No. 49A— $3\frac{1}{2}$ " x $6\frac{1}{2}$ "; No. 5—5" x 10"; No. 8—8" x 16"; No. 12—12" x 16". Wet cutting systems available for Nos. 5, 8 and 12. Automatic bar feed available for Nos. 8 and 12. Special machines for capacities to 48" x 48".



Products by Wells are Practical

**METAL CUTTING
BAND SAWS**

WELLS MANUFACTURING CORPORATION
707 COOLIDGE AVE., THREE RIVERS, MICH.

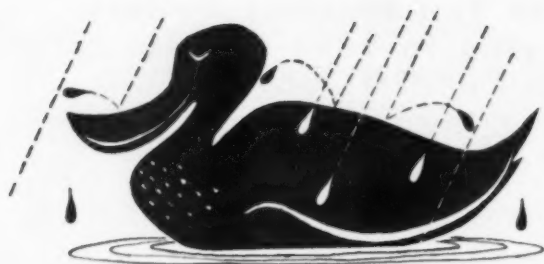
gineer center at Fort Belvoir, Va.

Full information and application forms may be secured at most first- and second-class post offices.

A four year course in tool engineering will be offered by **Toledo University** when its fall sessions begin on Sept. 11 of this year. The curriculum, which was developed in cooperation with Toledo Chapter No. 9 of the American Society of Tool Engineers, is open to high school graduates.

A certificate of Associate in Industrial Science will be granted to those completing the course. Forty-three of the 56 credit hours in the curriculum can be applied toward a degree in engineering.

Due to an expanding business **Grand Tool & Supply Co.** has moved into their new and larger quarters at 176 Grand Street, New York 13, N.Y. This firm features a full line of small tools and



HOW TO DUCK THE WELD-SPATTER PROBLEM

Use Protect-O-Metal and weld spatter wipes off as easily as water from a duck's back! With Protect-O-Metal you speed welding and save up to 85% of weld cleaning time and labor. Brush or spray P. O. M. in weld seam and on adjacent metal—weld—then brush off spatter in seconds.

Just a little P. O. M. goes a long way too—costs less than 1/10¢ per foot of weld protected, saves up to three times its cost in time savings alone. Order a trial gallon (\$3.25) satisfaction guaranteed or invoice will be cancelled.



G. W. SMITH & SONS, INC., 5410 Kemp Road, Dayton, O.

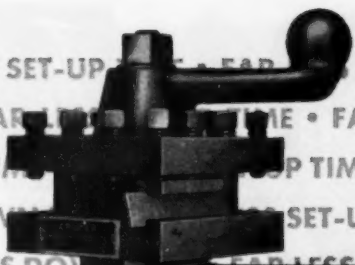
machine shop equipment. They also market a complete line of angle plates, die heads, tapping attachments, live centres, milling machine arbors, and adapters.

Europe's largest builder of heavy machine tools, **Schiess A. G., Duesseldorf, Germany**, has appointed **Kurt Orban Company, Inc.**, 205 E. 42nd St., New York 17, N.Y., exclusive American distributor.

Mammoth Schiess equipment such as vertical boring mills up to 84 ft. turning diameter, vertical turret lathes up to 71 in. diameter and horizontal boring and milling machines up to 12½ in. spindle diameter, will be exported to the United States for the first time in the company's 72 year history.

Diamond Tool Research Co., 305 E. 45th St., New York 17, N.Y., has an-

FAR LESS SET-UP TIME • FAR LESS
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America's first and finest

CROZIER TOOL POST TURRET

now with 12 position indexing

12 position indexing now makes possible the alignment with work at any thirty degree increment.

This is only one of the outstanding features developed by the first and largest manufacturer of turrets for small lathes. Other features include built-in cut-off tool and holder and positive rapid indexing. All wearing parts are hardened and precision fit. They are available in three sizes.

Switch to Crozier Tool Post Turrets today. Save as much as 75% set-up and down time. Model 31, for Logan, Atlas, Craftsman, South Bend, etc. \$30.80. Write for catalog.

CROZIER MACHINE TOOL CO.

Dept. MTB-9

Hawthorne, California

nounced that important new developments in bonds are impending and will soon be announced. A new catalog, showing 16 types of diamond wheels, and soon to be released, is over three times as large as the present eight page one.

The National Safety Council has just presented an award of merit to the 300 employees of Plant No. 3 in the construction machinery division of Chain

Belt Co., Milwaukee, Wis. The award was for the performance of 1,297,204 man-hours of work, from May 29, 1950 to Dec. 31, 1951 without a disabling injury.

An initial product of the Hartford Machine Screw Co., Inc., Dept. BB, Hartford, Conn., who recently entered the textile machine products field, will be the Hartford ball bearing spindle for spinning and twisting. This was for-

Over 85% of the torque wrenches used in industry are

STURTEVANT TORQUE WRENCHES

Read by Sight, Sound or Feel

- Permanently Accurate
- Practically Indestructible
- Faster—Easier to use
- Automatic Release
- All Capacities

in inch ounces
... inch pounds
... foot pounds
(All sizes from
2-8000 Ft. Lbs.)

Every manufacturer,
design and production
man should have this valuable
data. Send upon request.

P.A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS

Tool and Die Design Training

**ACME-TRAINED MEN
EARN \$15,000 YR.!**

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\$15,000 yearly not unusual for Acme-trained Tool and Die Designers! Industry desperately needs competent men. Learn quickly by easy home study. No art ability required. Acme graduates go farther faster in Tool and Die Designing. Famous "COPE" Correspondence System includes same methods and texts used by our residence schools.

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GROB
BROTHERS
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Greenerd ARBOR PRESSES

For Assembling
Keyway Cutting
Broaching
Piercing
Oil Grooving
Straightening
Forming
Pressing
And many other
jobs

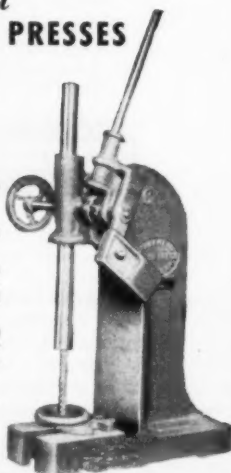
65 Standard styles
and sizes

From $\frac{1}{4}$ to 35 tons
pressure for manu-
ally operated
presses

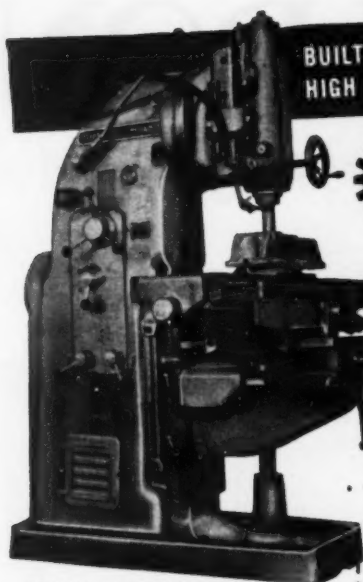
From $1\frac{1}{2}$ to 30
tons pressure for
motor driven hy-
draulic presses

Originators of the
Arbor Press

Send for Cat. 40-H



GREENERD ARBOR PRESS CO.
141 CROWN ST. • NASHUA, N.H.



**BUILT FOR ENDURANCE AND
HIGH SPEED PRODUCTION!**



NEW VERTICAL MILLING MACHINE

Model A.V. 3N

SHORT DELIVERY

... No Priority Required!

PARTIAL SPECIFICATIONS

Table surface	57" x 14"
Table power trav.; Long	39 1/4"
Cross	11"
Vertical	17 1/4"
Vert. trav. of spindle	6 5/8"
Max. dist. spindle to table	19 5/8"
12 spindle spds.; Range	16-650 rpm
9 table power feeds rates, p.m.	
Long. & cross	3/8-13 3/4"
Vertical	5/16"-9 5/8"
Quick power trav.; all dir.	37"
Spindle taper, Amer. Stan.	50

POWERFUL and rugged, the DIMCO Vertical Miller is precision designed and constructed to give top, economical service. Other fine DIMCO machine tools include engine and turret lathes, grinders, shapers, radial drills, facing lathes, etc. Write us today for complete details!

**KELVIN SYSTEMS
CORPORATION**

135 FRONT ST. NEW YORK 5, N.Y.



IMPORTERS OF MACHINE TOOLS

**RADIAL DRILLS • MILLERS
TURRET LATHES • GRINDERS
SHAPERS • COPYING LATHES**

merly the Century spindle, produced by Hartford for H & B American Machine Co., of which there are now said to be 92,000 in use.

A southern division for sales, engineering and development has been established at 110 W. McVee Ave., Greenville, S. C.

Horace Douglass Moulton, now vice president of operations of U. S. Steel

Products Div., United States Steel Co., has been appointed assistant vice president of raw materials.

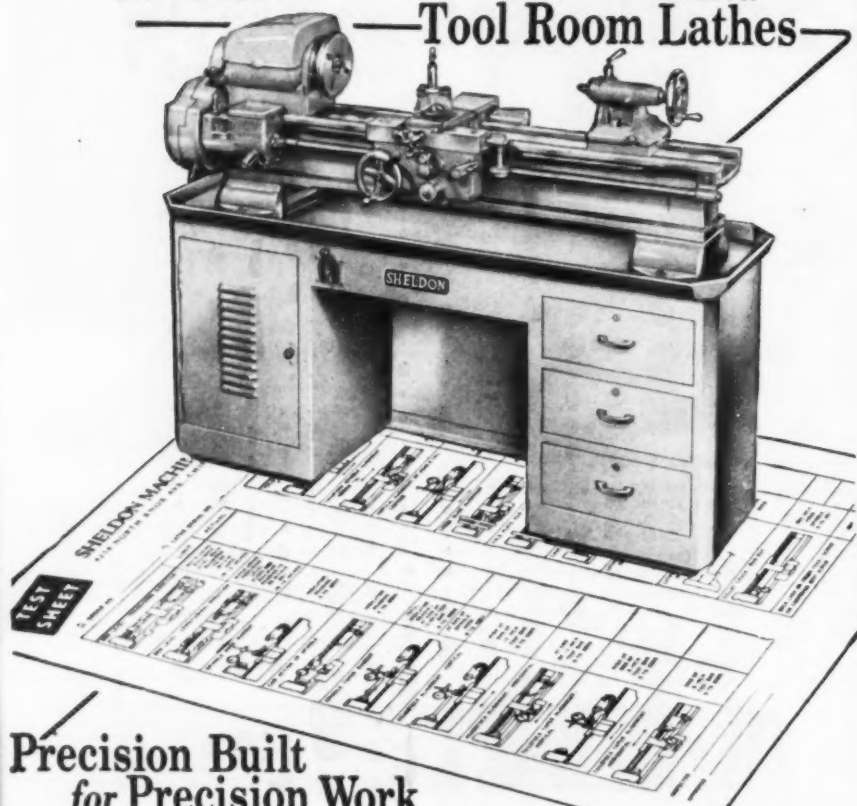
He joined United States Steel in January 1939, at the Los Angeles plant of U. S. Steel Products, rising in rank until he came to New York as manager of operations in January 1946. On December 18, 1946, he became vice president of operations of this United States Steel division.

SHELDON

CHICAGO

U. S. A.

Tool Room Lathes



Precision Built for Precision Work

Each SHELDON Lathe is a precision machine tool that in final inspection has passed the 19 accuracy checks on the SHELDON "Inspection Test Sheet."

Produced by modern

methods with the finest special machines, these 10", 11" and 12" (swings 13") lathes are quality built on a quantity production basis. Selling at quantity production prices they are today's best lathe values.

SHELDON MACHINE CO., INC.

4242 North Knox Ave.,
Chicago 41, Illinois

What's New

IN METALWORKING

Sheffield Model No. 140 gear grinder

Production of an entirely new type of high precision gear grinding machine is announced by the Sheffield Corp., Dept. BB, Dayton 1, Ohio. It claims to be the first of its kind to be made and become available commercially in this country. This new gear grinder is said to be capable of producing gears at a faster rate and with more constant uniform accuracy than ever before achieved in mass production.

The grinding method is unique in that the periphery of the wheel is formed with a helical rib by a combination of Crushtree and diamond dressing. The gear blank, mounted on a mandrel between vertical dead centers, rotates continuously at a set rate in direct relationship to the grinding wheel into which it is fed in an upward direction during the grinding operation. Work drive and grinding wheel drive are interconnected by gearing, which can be changed easily as required by the number of teeth to be ground.

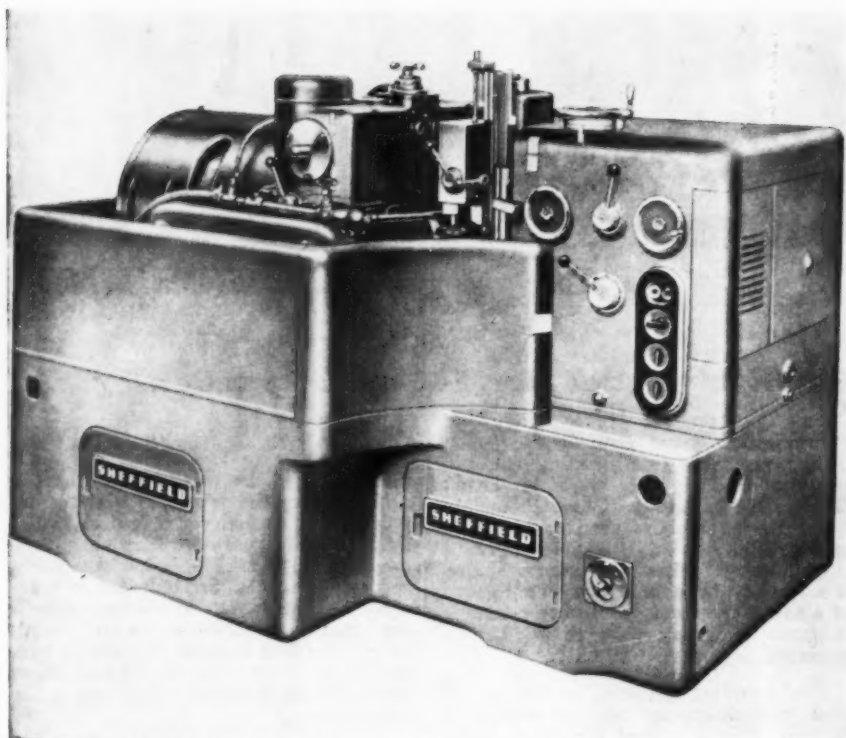
Without stopping the grinding wheel, work can be removed from the machine for inspection and, when replaced, is automatically properly located without further adjustment. Two additional sets of gears provide for selecting the helical lead and for controlling the speed at which the work is fed past the wheel. The operation resembles gear hobbing, with the helical ribbed

wheel taking the place of the gear hob.

In addition, the work rolls across the full width of the wheel so that the involute form is generated entirely automatically and without further adjustment of the machine after its initial setting. The need for indexing is completely eliminated. The continuous rolling motion distributes wear evenly across the full face of the wheel, preserving the accuracy of the full wheel form so that frequent redressing is unnecessary.

The machine will accommodate gears up to eight inches in diameter and will grind up to four inch maximum length of teeth. Pitch range is from a minimum of 50 diametral to a maximum of 8 diametral or 0.4 circular. Quantities of gears of 16 diametral pitch and finer can be ground simultaneously from the solid. Maximum helix angle of teeth is 45 degrees. Helical and spur gears of the same pitch can be ground with the same wheel without redressing. The helical ribbed wheel enables any diameter gear to be ground of similar diametral, circular or module pitches without any additional setting up of the machine except for changing the change gears for the proper number of teeth and repositioning the wheel for the new diameter.

Accuracy of the work depends greatly on the accuracy of the helical ribbed



The Sheffield Model 140 Gear Grinder is claimed to be capable of producing gears at a faster rate and with more constant uniform accuracy than ever before achieved in mass production. It is the outgrowth of a similar machine made in England which Sheffield has redesigned and developed for the American market.

form on the grinding wheel which is produced initially by preformed Crushtrue dressing and then finished to extreme accuracy by diamond dressing. Both the Crushtrue and diamond dressings are performed automatically. Other features of the wheelhead and workhead, lubricating and coolant systems, and electrical equipment, conform to the highest machine tool standards of this country.

This new American machine tool is the outgrowth of a similar machine made by the Coventry Gage & Tool Co. of Coventry, England, which Sheffield has redesigned and developed for the American market.

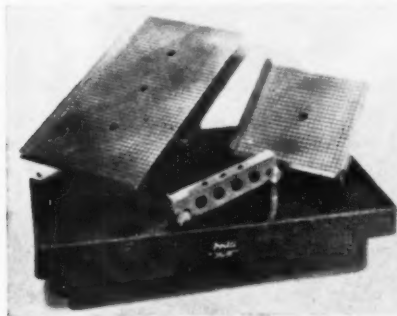
Sine plates for close tolerance layout

Sine plates, affording appreciably larger working surfaces for precision checking of angles on large work pieces, are now being manufactured by the DoAll Co., 254 N. Laurel, Des Plaines, Ill. The new sine plates are available in two sizes 5" and 10". Top area of the 5" plate is 6"x6"; top area of the 10" plate is 7"x12".

The broad working surfaces are said to permit difficult checking jobs to be handled with ease.

A feature of the new sine plates is

the "three-point" base arrangement. Two short cylinders, spaced $5\frac{1}{4}$ " apart between centers, are used in place of the single piece base cylinder commonly employed in sine fixtures. This minimizes errors which commonly occur with sine fixtures using the long cylinders. The base is sufficiently wide



so that the danger of tipping is reduced and the needed stability is obtained for making rapid checks of large angle castings, tools, dies and other pieces.

Right-angle worm-gear motor

Low speed right-angle worm-gear motors have been placed in production by U. S. Motors, Inc., Box 2058, Los Angeles 54, Calif. Introduced as Type GW Syncrogear, the design presents numerous exclusive features it is claimed, not heretofore available in low speed motors. Type GW incorporates a cantilever design to protect gear alignment. Mounting stresses are absorbed by a rugged single unit pyramidal base with "spread eagle" feet. The gear and motor housing are free from distortion. It embodies splash lubrication, a hardened and ground worm, leakproof oil seal and asbestos-protected windings. It has self-locking brake action. The parabolic contour of the motor housing gives the unit a pleasing appearance. This new motor is built in speed ranges from 20 to 155 r.p.m. and gear ratios up to 58:1. Horsepower ranges from $\frac{1}{4}$ to three. It is made in both three-phase

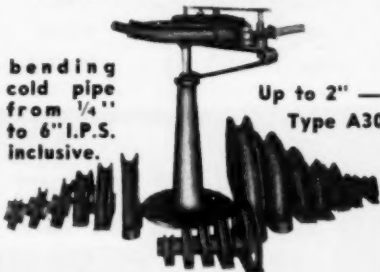
"The American"

LINE OF COLD PIPE,
CONDUIT AND HEAVY
WALL TUBE BENDERS
HAND AND POWER

ONE OF 10 HAND-OPERATED TYPES

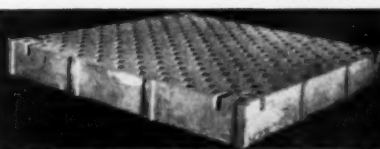
bending
cold pipe
from $\frac{1}{4}$ "
to 6" I.P.S.
inclusive.

Up to 2" —
Type A30



MOTOR-POWERED TYPE E AND F

5 and 7 $\frac{1}{2}$
h.p. —
Bend up
to 90°
without a
mandrel.
Motor-
Operated
capacities
2 $\frac{1}{2}$ " to 6"
inclusive.



COMBINATION BENDING TABLES

For hot or cold bends of various
shapes, pipes, bars, etc. 5' sq.;
7' sq. (3 $\frac{1}{2}$ ' x 7' pairs) suitable
for welding together. Other sizes
or custom made to your speci-
fications.

AMERICAN PIPE BENDING MACHINE CO., INC.
9 Furnace Street, Poultney, Vermont

TRY THIS BRAND NEW

Cutting Carbide



IN
YOUR
PLANT



Why you should investigate S-6 at once

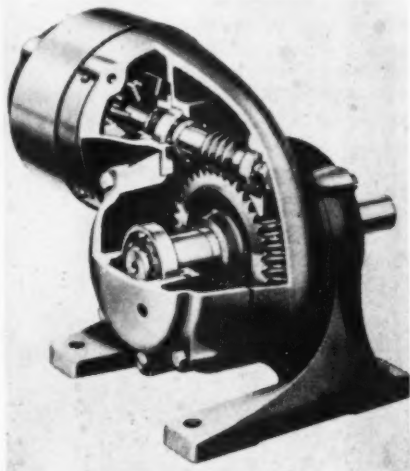
- S-6 Carbide is a brand new and different grade of Cutting Carbide.
- S-6 Carbide performs best at slow speeds where other carbides cannot be successfully used. — It is especially suitable for use on old or slow speed machines.
- S-6 Carbide — excellent for interrupted cuts.
- S-6 Carbide removes stock faster because of permissible heavy feeds.
- S-6 Carbide is industry-proven on machining Armor plate, rough steel forgings and castings.

Write today for Catalog No. 108 which shows all other standard grades of Newcomer Carbides.

NEWCOMER PRODUCTS, INC.

General Sales Office PITTSBURGH 21, PA.
Plant at LATROBE, PA.

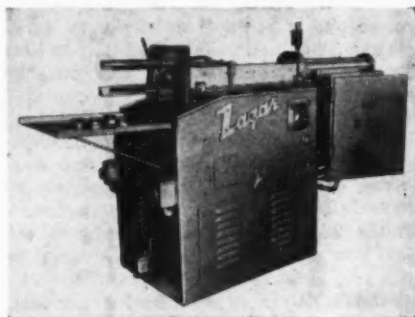
and single phase. The GW Syncrogear can be installed horizontally or upright



and can be provided with a footless flange mounting. Other modifications provide variable speed, splashproof design and total enclosure.

Zagar "Hyspeed" 20" broaching machine

Speed, from the standpoint of operation and strokes per hour, is claimed for this broaching machine manufactured by Zagar Tool, Inc., 24000 Lake-



land Blvd., Dept. BB, Cleveland 23, Ohio.

The "start" pedal is double-sided so that the machine can be operated on

either side for the convenience of the operator. Two emergency "stop" switches permit the machine to be stopped quickly either with knee or hand. It is hydraulically operated and electrically controlled.

The electric control panel has a selector switch which determines an automatic return stroke or the conventional broaching stroke which stops at the end of each cutting stroke. The coolant system pumps either light or heavy cutting solvents.

Specifications include: maximum pull, 6000 pounds; maximum feed stroke variable between 2 ft/min. and 27 ft/min.; full return stroke of 20" requires 1½ seconds; floor space: 3 ft. x 9 ft.; cycles at 700 strokes per hour.

Abrasive wet blast

An abrasive wet-blast machine for producing refined finishes on production tools is currently being manufactured and stocked for quick delivery by Abrasive Wet-Blast, Inc., Dept. BB, Niles, Ohio.

Special abrasives suspended in water,

applied by air pressure, is the operational procedure, and it can be quickly taught to any person on actual processing of parts.

Metal removal is negligible, retaining all close tolerances on accurately machined tooling, as action of process, is to procure a refined finish on particular tools selected.

Form cutters, gear cutters, hobs, drawn dies—permanent die cast moulds, extrusion dies, taps, etc., having this finish applied, are said to increase capillary attraction for lubricants, reduces friction, increasing tool life between grinds and gives greater production, as tendency is to eliminate pile up on cutting edge.

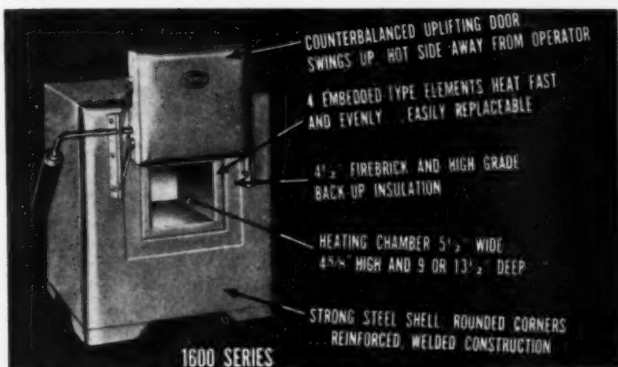
Gas-fired radiant tube unit

The Lindberg Engineering Co., 2442 West Hubbard St., Chicago 12, Ill., has added a gas fired vertical radiant tube unit to their line of carbonitriding furnaces.

The light weight vertical radiant tubes can be removed and replaced in

solve heat-treat problems

**with versatile
Temco bench-
type furnace**



Step up production, cut costs with Temco electric furnaces for heat treating dies, parts, tools, etc. Model illustrated above one of eight convenient sizes available with either electronic or manual temperature controls. Economical,



ELECTRIC FURNACES

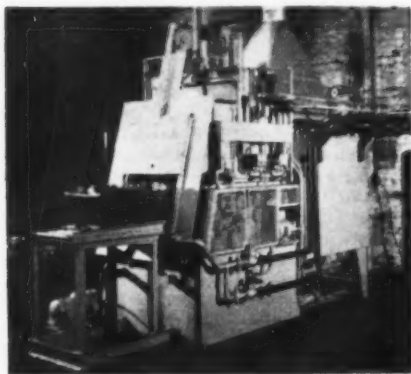
THERMO ELECTRIC MANUFACTURING CO.

easy to install and operate, low cost. Priced from \$55.00 to \$507.50. Write for literature and nearest dealer's name.

486 HUFF ST., DUBUQUE, IOWA

a matter of minutes, eliminating costly production down time while the furnace cools.

The furnace is rated 250 net pounds



per hour for hardening or flash case, dry cyaniding. It is a completely packaged unit with built-in quench system and automatic cycle control.

The Lindberg "Hyen" endothermic

atmosphere generator is adjustable to produce different atmospheres not only for carbonitriding, but also for carburizing, annealing and bright hardening.

Longer-lived die springs

Packed in unit lots, making them easier to store and inventory, and made in a selection of 141, Precision Standard die springs, manufactured by Precision Spring Corp., Dept. BB, 800 W. Broadway, Three Rivers, Mich., claim longer life through design and quality of wire.

Made of an annealed valve spring quality wire, the surface is shot peened thoroughly to produce surfaces free from pits, scratches, etc. Though the line of springs covers most needs, special ones can be made to order.

Those springs made of oval wire are designed for general die use where spring deflection and solid height are important. The ones made of rectangular wire are designed for use where heavy load and little deflection are required.

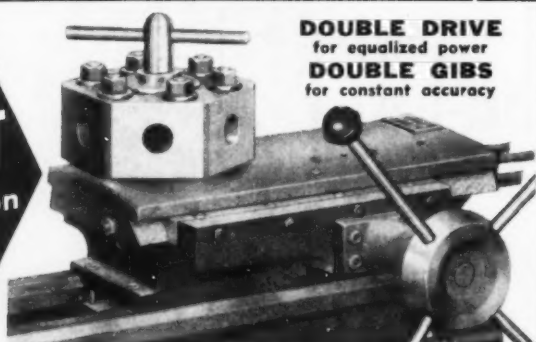
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HEXTURRET
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Costs and Speedier
Output

- ✓ Custom built to fit all lathes from 9" to 18"
- ✓ Smooth, sensitive control with Pilot wheel drive through twin gears and racks.

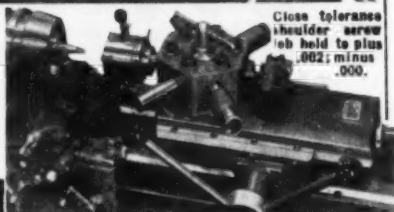
Also manufacturers of Enco Turret Tool Posts for all Lathes, and "MITI-MITE" Magnetic Base Tools.

- ✓ All bearings surfaces hand scraped.
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DOUBLE DRIVE
for equalized power
DOUBLE GIBS
for constant accuracy



Close tolerance
shoulder screw
held to plus
.002; minus
.000.

ENCO Manufacturing Co., Dept. 292

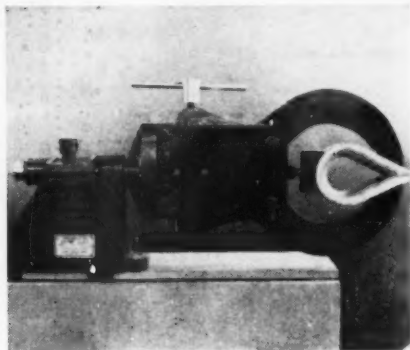
4324 W. FULLERTON AVE., CHICAGO 39, ILL.

Reasonable Deliveries

Wire rope splicer has two assemblies

The "Torquemaster" No. 10, wire rope splicer, manufactured by Quay Industries, 100 Barr Bldg., Dept. BB, Washington, D. C., claims savings in man hours of up to fifty percent.

The unit represents refinements to their No. 9, following three years of research and development. Tested by both heavy industry and the armed



services, it is said to hold up well to punishment yet give speed and ease of operation to even the inexperienced worker. A feature is its ability to overcome cable torque through a resistance regulator and swivel action jaws. Two assemblies utilize the same base. The small one takes $\frac{3}{8}$ " to 1" and weighs 39 lbs. while the large one has a capacity of from $\frac{3}{4}$ " to 1 $\frac{1}{4}$ " and weighs 79 lbs.

Bushing extractor for blind holes

A bushing and bearing extractor for blind holes, which has been engineered on an entirely new principle, has been recently introduced by Crozier Machine Tool Co., Dept. BB, 684 N. Prairie, Hawthorne, Calif. This product, according to G. E. McKinney, sales manager, saves as much as 75% of the labor time in extracting bushings, bearings, sleeves, liners, roller bearing cups, and races of magnet type bearings and similar objects.

The extractor, which was developed for the Navy, has been widely used



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NO KEYS
NO WRENCHES
NO PRODUCTION
DELAYS**

Meet sudden and sustained demands for high speed production on lathes, turret lathes, drill presses and milling machines by using the new No. 25 Allison Collet Chuck or Allison Dividing Head. Adapted to use of Jacobs Rubber-Flex Collets in sizes from $\frac{1}{8}$ " to 1 $\frac{1}{2}$ ". To tighten collet, operator simply draws lever ball toward him; to release collet, he pushes lever away. Simple, fast and fool-proof. Speed up every operation for better production profits with the Allison-Jacobs combination.

ALLISON CHUCK PRODUCTS

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San Pedro, California

Send catalog page and prices on Collet Chuck and Dividing Head, and name of nearest supply house.

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CITY STATE

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**INCREASE PRODUCTION
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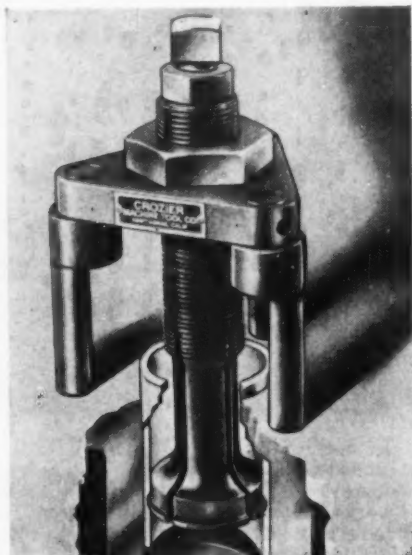
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DURANT TOOL SUPPLY CO.

155 ORANGE ST., PROVIDENCE 3, R. I.

throughout the world. It eliminates the necessity of machining bearings, and minimizes the hazard of injuring castings or excessive dismantling of equipment.

The Crozier extractor consists of eight threaded expanding arbors, a draw table with two sets of legs, short



and long, adjustable as to distance from the work, and can handle any hole from $\frac{1}{2}$ " to 2" in diameter. A maximum of $2\frac{1}{2}$ " may be drawn at one setting, and press fits of over five tons have been extracted readily with this unit. Because of its adjustability, this set eliminates the need of stocking many sizes of pulls.

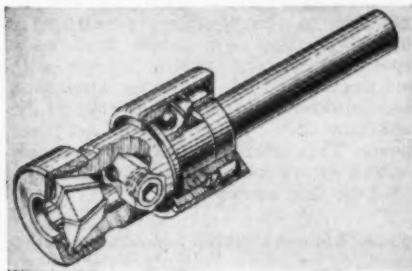
Self-releasing tap holder has "ball action"

A self-releasing tap-holder recently developed by the Roddick Tool Co., Box 109, Anaheim, Calif., can be used for either right or left-hand threading and depends on ball-action for its release.

The steel balls are incorporated in the mechanism to provide for a smooth, accurate control of thread depth. Power feed can be used providing the feed does not exceed the threading rate of

the tool.

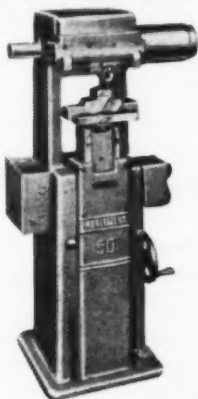
Taps can be changed in a few seconds without the use of extra bushings. A Jacobs rubber-flex collet at the front



of the holder takes No. 10 to 1/2-inch taps. The ball-action tap-holder is available with 5/8- and 3/4-inch shanks which can be sawed off if necessary.

Noblest automatic roll marking machine

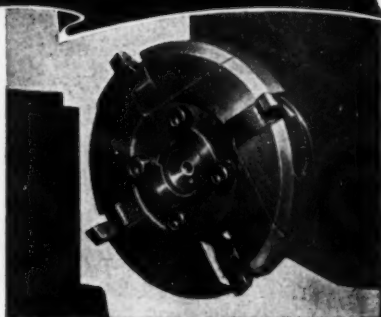
A general purpose roll marking machine has been announced by the Noble & Westbrook Mfg. Co., 9 Westbrook St., East Hartford, 8, Conn. This new model combines the characteristics of a universal machine with that of a special



purpose high production machine and is suitable for manufacturers with large quantities of component parts which vary in size and shape and require permanent marking. As compared with a special purpose marking machine, tooling for the new model is relatively in-

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UNIVERSAL FLY CUTTER



Above: FACE MILLING



ABOVE—a few of the many cuts that can be made with the New-Field Universal Fly Cutter in ONE operation on a horizontal or vertical mill or drill press. Individually adjustable bit holders permit slots of any shape to be cut 1/8" to 2" wide.

STANDARD BITS MAKE 4 TO 6 DIFFERENT CUTS IN 1 OPERATION

For many types of milling, light metals and plastics as well as steel, there is no longer need for special cutters. A single New-Field Universal Fly Cutter, utilizing any type of standard high speed steel or carbide bits, makes multiple cuts in one operation. In contrast with expensive specially ground cutters, the standard bits used in the New-Field are easily and quickly ground in your own shop, readily replaced or reground for other work, at small cost. There is practically no down-time if a bit is broken.

The New-Field fits all standard arbors, turns to any required speed for fly cutting, slotting, surface and straddle milling, gear cutting, disc and gasket cutting. Standard sizes are 4", 6", 8", 10".

Write today for details of this versatile, production-upping, money-saving tool.

NEW-FIELD MACHINED PARTS CO.

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- **FASTER SPEEDS**
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- **LOW PRICES**

MODEL JA
50,000 R.P.M.

Weight 12 ounces; length 6 3/4 inches; chuck size 1/8 inch. Wheel guard removed for better illustration.

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THEY GRIND—NOT JUST RUB!

The RPM's stay up while grinding... not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind... not just rub. Every mechanic knows this, but an inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work... longer wheel life.

MADISON-KIPP CORP.

207 Waubesa St., Madison, Wis., U.S.A.

Write for KIPP Air Tool Catalog at 3006

expensive and set up time is held to a minimum, it is claimed.

The machine represents a modification of the company's standard Model 50PI, all pneumatic marking machine. In addition to the complete pneumatic operation, the new model features a special electro-pneumatic circuit with an electronic cycle timer for automatic continuous operation which requires the operator only to load and unload piece parts. This machine can be equipped with a rotary feed, air vice, or air operated ejection device.

The basic machine features an air operated work table, which provides marking pressure and allows compensation for dimensional variations in piece parts. Depth of mark is controlled entirely by air pressure as preset at the pressure regulator. It also has an air operated die slide in which the marking die is held. The new machine can be set for semi-automatic or automatic operation as required. For single cycle operation a master foot control is provided at the base. For automatic operation a master switch is closed to energize the electronic timer which will cycle the machine continuously. Semi-automatic operation can be used.

Each machine is equipped with a combination air controlled unit which includes an air line filter, pressure regulator, pressure gage and air line lubricator. The filter removes foreign material and moisture from the air line and the lubricator delivers a fog of oil through the air circuit to lubricate the valves and cylinders.

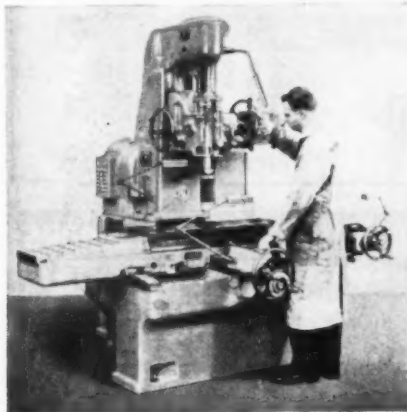
Rivet selector

Selection of the correct tubular or split rivet for an assembly is easily made with the use of a pocket size rivet selector prepared by Chicago Rivet & Machine Co., 9610 W. Jackson Blvd., Bellwood, Ill.

Merely dialing the selector to any proposed size and type of rivet instantly and automatically discloses the necessary rivet clinch allowance, the recommended assembly hole diameter and the rivet head diameter; it will be sent without charge to anyone interested.

Small jig borer has electro-limit measuring

Pratt & Whitney, Division Niles-Bement-Pond Co., Dept. BB, West



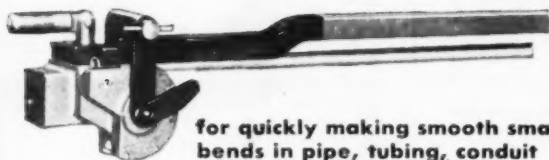
Hartford 1, Conn. has announced a new small-size jig borer, which is the second

model of a new series of completely new design borers being added to their present line. It is the smallest of the new machines which feature the Electrolimit measuring system, and has been designated the No. 1E.

The No. 1E is said to be an unusually accurate machine for precision locating, drilling and high-speed boring in small work. Design improvements in the new machine include: a heavier and wider bed construction, table and carriage way telescoping guards, built-in measuring, a new design quill mounting and a handy control center for faster and easier operation.

Table settings accurate to .0002 inch are made quickly with the Electrolimit system. Two measuring units, entirely independent of traversing screws, control the longitudinal and transverse settings. Basic one inch spacings are obtained electromagnetically from a solid master bar and registered visibly by a zero reading on an indicating meter. Since there is no mechanical contact involved to cause wear, the ori-

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Forming small-radius bends without flattening or kinks is simple, speedy work with a GREENLEE Hand Bender. Ideal in the shop for pipe and tubing installations on machines... especially designed to form neat bends for sharp corners, nooks and other close quarters. Various models and sizes for steel, copper, brass and aluminum tubing or pipe, rigid and thin-wall conduit



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**5/8" KNUCKLES, 19, 18 & 16 GA.
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WILL DETECT OUT-OF-
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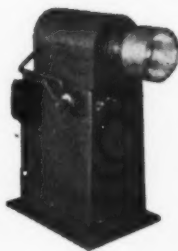
Dies for high precision work
should not only be perfectly
aligned but provision should be
made to maintain that alignment throughout
the life of the die. Our bulletin shows how it
can be done.

WALTHAM MACHINE WORKS WALTHAM 54, MASS.



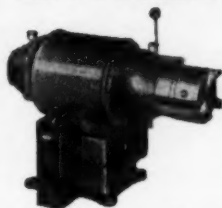
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There's a Schauer Speed Lathe to solve every individual secondary finishing operation. Chuck, collet or vacuum holding fixtures. Single, two speed or variable speed motors. Bench and pedestal models.



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SCHAUER MANUFACTURING CORP.

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ginal accuracy is retained indefinitely. Fractional inches are obtained by moving a small electromagnetic unit between the inch spacings on the master bar with a super-precision micrometer screw. A large $4\frac{1}{2}$ " micrometer barrel allows easy reading to .0001 inch.

The new spindle quill mounting is designed to maintain its initial rigidity and accuracy for the life of the machine. The hardened, ground and lapped quill "roll feeds" on 300 specially selected precision balls. The balls are preloaded between the hardened quill and hardened spindle head bore and are guided in a staggered distribution by a phenolic bearing cage. Hand feed operation is highly sensitive for small-hole drilling.

Spindle speeds and feeds have been increased. The No. 1E has 16 spindle speeds ranging from 65 to 2800 r.p.m. and four spindle feeds, both up and down, ranging from .0006 to .006 inches per revolution.

Two table sizes are available with increased longitudinal travel on the large size. The 12 x 24 inch table has

18 inch longitudinal travel and 12 inch transverse travel and the 12 x 42 inch table has 36 inch longitudinal travel. Special columns four or six inches higher than standard can also be furnished to increase the normal 20 inch capacity between table and spindle.

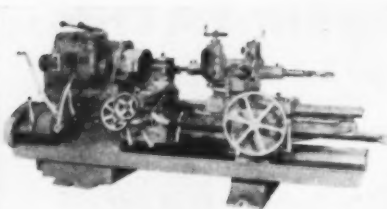
Red Ring rolling fixture

A gear rolling fixture with a column type work head has just been announced by National Broach & Machine Co., Dept. BB, 5600 St. Jean Ave., Detroit 13, Mich. Its use indicates errors in both size and eccentricity of the work gear. In addition it is said to reveal any excessive tooth roughness that may exist.

The adjustable work head is set at precise center distance from the master gear spindle carried on a floating spring-loaded slide. This is usually done with precision gage discs.

When the work gear is rolled in mesh with the master gear the errors indicated above are read directly on a dial indicator actuated by any move-

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Turret Lathes For Early Delivery

- 4½-inch collet capacity.
- Made by leading 80-year-old machine tool manufacturers.
- Standard American design and construction throughout.
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- Competitively priced.

*Write on your company
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- ☐ Free bulletin
- ☐ Prices and delivery date
- ☐ Appointment to inspect a battery
of these machines in operation

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U. S. Representatives

PITNAM INDUSTRIAL PRODUCTS COMPANY

*Division of Cement and
General Development Corporation*
608 Fifth Avenue New York 20, N. Y.

ment of the master gear slide.

The column type work head assures maximum rigidity. The upper center, which is counterbalanced, facilitates



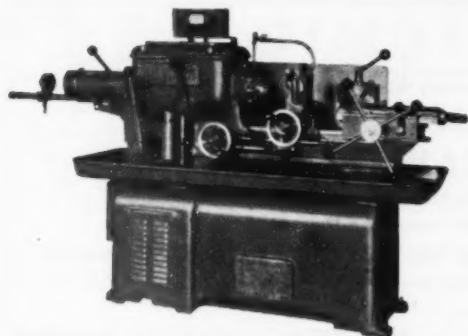
quick set-up. It is also spring-loaded for easy loading and unloading. The knob on the right of the column is used to raise or lower the center slide. That on the left is used to lock it in place.

Pilot bearing bushing provides dust seal

The J. G. Jergens Co., 11106 Avon Ave., Cleveland 5, Ohio, has announced



a new type pilot bearing bushing which the manufacturer states provides a



Plain or Back-Geared—Forged steel spindle with anti-friction precision bearings, friction clutch and brake. Spindle nose, 2 $\frac{3}{8}$ "-8.

Write today for complete details.

SIMMONS MACHINE TOOL CORP.

1725 North Broadway, Albany 1, N. Y.

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The new Simmons No. 2 Turret Lathe, offered to you with three distinct advantages:

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1 $\frac{1}{4}$ " bar capacity . . . 14" swing over ways. Micro-Speed Drive offers infinite speeds—plain, 375 to 1500 RPM; back-geared, 44 to 750 RPM — for bar or chucking work. Power feed to turret.

complete, life-time seal against damaging grit and dust.

The entry of grit or dust into the outer seal is said to increase the effectiveness of the seal. The cartridge-type design of the bearing holder offers greater accuracy than bearings placed directly in machines or die fixtures—protects against thrust loads as well as radial, and offers greater bar support due to the overall length of the bushing.

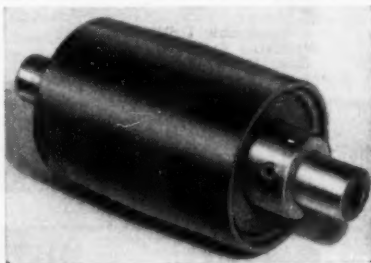
With use of the new bushings, tapered bearings can be adjusted to compensate for wear and are adaptable to receive removable slip bushings as well as keys or keyways.

Improved ball bearing idler rollers

Crown faced idler rollers with precision-type radial and thrust ball bearings are announced by the Samuel Olson Mfg. Co., Inc., 2423-29 Bloomingdale Ave., Chicago 47, Ill.

The bearings are protected by felt and metallic seals and can be lubri-

cated through the ends of the shafts. The rollers can be mounted in horizontal or vertical position or at any angle for use with light weight power



conveyors and various types of industrial equipment.

They are available in 2 $\frac{1}{2}$ " and 4 $\frac{1}{4}$ " diameters, widths to specifications.

3 new compressors by Ingersoll Rand

Ingersoll-Rand, 11 Broadway, New York 4, N. Y., rounds out of its line of Gyro-Flo portable compressors with

INSTANT ACTION RAPIDSET by HARTMANN

All Purpose Tool Room and
Machine Shop Vises.

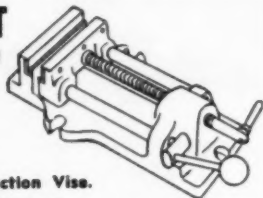


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Adjustable Pressure Production Vise.

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Hartmann Mfg. Co., 1637 Gould St., Racine, Wisconsin



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setting the Defense pace
with Outstanding PERFORMANCE



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 - Built to Precision Standards
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Adjustable Drillheads of
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4 Sizes • Friction & Positive Drives
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Geometrically correct for true three dimensional work. Accurately duplicates master copy in metals, plastics or wood. Rugged, sturdy construction.

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- Engraves in 2 or 3 dimensions.
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- High speed, ball bearing spindle.
- Chuck $\frac{1}{8}$ " to take variety of small tools, burrs, mounted points, as well as standard cutters.

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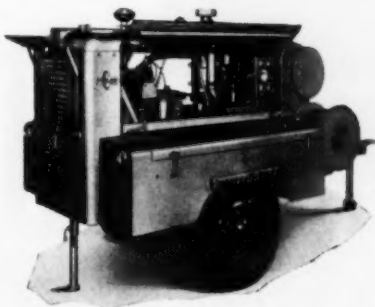
Cambridge, Mass.

three sizes in addition to its 600 c.f.m. model. The introduction of 315, 210, and 105 c.f.m. units makes the advantages of the rotary sliding-vane design available for a wide range of operating requirements. Major benefits claimed by the manufacturer are simplicity and low cost of operation and maintenance, and greater reliability. Smaller dimensions, greatly reduced weight, and discharge temperatures at least 100° lower than conventional portables are other important advantages.

The two-stage, oil-cooled, rotary sliding-vane compressor design of the machine eliminates most of the problems of reciprocating units for portable service. There are no valves to leak, no pistons, rings, rods or clutch to wear. Air, discharged at less than 200° under normal operating conditions, together with thorough oil separation, eliminates hose deterioration caused by heat and oil. The continuous rotary action provides a steady flow of air without pulsations or vibrations.

It is equipped with "Air Glide" Capacity Control, that controls the air output smoothly over the full range from 0 to 100% capacity.

The 600 c.f.m. model is powered by a General Motors diesel engine. The 315



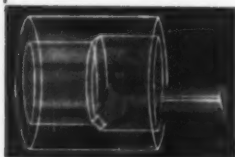
and 210 c.f.m. sizes offer a choice of either GM diesels or Continental Red Seal gasoline engines. The 105 uses a Continental gasoline engine.

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WITH EXTRA ADVANTAGES!

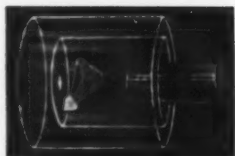
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- IN FOUR FORMS
- FULL RANGE OF SIZES

To resharpen — grind top face only.
Made of Super-High-Speed steel or carbide
tipped.

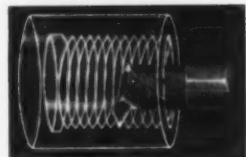


ALL STYLES

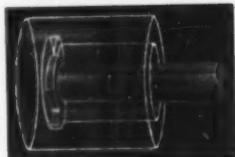
for general
boring



for bottoming
and facing



for internal
threading



for recessing



for boring holes
of $\frac{1}{16}$ " min.
diameter



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R. B. TOOL CO., INC.

Dept. BB

785 North Broadway, White Plains, N. Y.
WH ite Plains 6-8050

Dowel pin reamers

Lavallee & Ide, Inc., Chicopee, Mass., announces the introduction of a reamer set selected especially for the reaming of dowel pin holes.

The set consists of fourteen reamers, in pairs from $\frac{1}{16}$ " by sixteenths. Each pair includes one reamer .0020" under-



size and one .0005" undersize, except the $\frac{1}{16}$ " which are .0020" and .0003" respectively. Tolerances are .0000" and .0002".

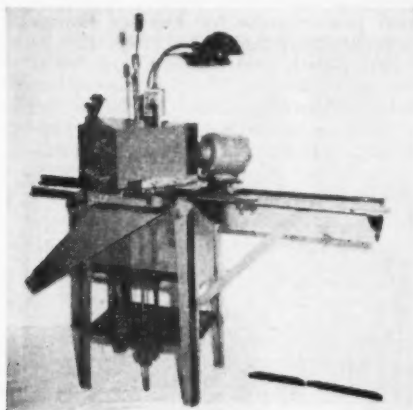
Sizes $\frac{1}{16}$ " through $\frac{5}{16}$ " are ground from the solid and made with external centers; larger sizes have polished flutes and internal centers. All have a back taper of .0005" per $1\frac{1}{2}$ ", with no relief on the flutes. Each shank is stamped with the exact size for quick identification.

Mitering machine hand or foot operated

A mitering machine made by Approved Devices Co., 525 Woodward Ave., Detroit 26, Mich., is claimed to increase production considerably. Because the molding is at all times stopped by means of a length gauge, more accuracy in length is also claimed.

Besides being operated by hand or foot it has provisions for removing set handles and connecting a gear box in

one end of which there is a crank for operating the steel saws. This crank is driven by an individual motor con-

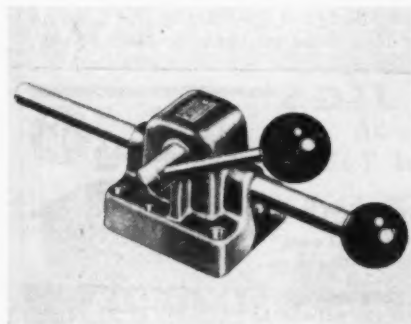


nected to the gear box; the operator's left hand is free to feed the molding to the gauge. As the steel saws are at the upper position, the operator simultaneously removes the part cut, etc.

This machine will cut two 45° miters in either plastic, wood or aluminum molding. The motor is 1/3 h.p., capacitor, 1725 r.p.m. Length over all is 44", width 24", height 48", work table height 34", weight 190 lbs.

Heinrich Grip-Master fixture lock

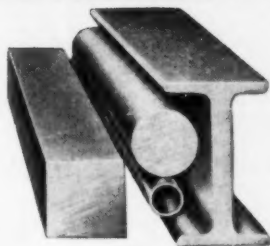
A screwless, quick-acting locking device for adapting to jigs and fixtures



that does away with screw type clamps and holding tools, has been announced

September, 1952

Atlantic WAVY SET BANDS...



FOR FASTER—MORE ACCURATE GANG CUTTING!

Specially designed teeth clear away chips for speedier—cooler—precise cutting. Atlantic Wavy Set Bands have precision milled, even set teeth that slice through multiple drill rods, bar stock, I beams or tubing for gang cutting efficiency.

ATLANTIC QUALITY CONTROL STARTS HERE . . .



Atlantic engineered with a wave of teeth to the left, then to the right to sweep away chips during cutting. Saw operation is Free! Easy! Efficient! Better finishes result with no chips to score or mar work.

The band saw teeth—and only the teeth—are scientifically hardened to guarantee the sharpest, keenest cutting edge. The entire saw body remains flexible. This precision heat treating increases blade life—saves blades, down time and dollars!



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This pictorial story on Atlantic Wavy Set Bands. Send for your copy today.

Atlantic

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Detterbeck Quality Tools

**SPEED UP
Screw Machine Production**

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We specialize in
CUTTING CAMS

**HIGH SPEED STEEL AND
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Inasmuch as we manufacture cams and tools for the trade we obviously do so on a production basis. As a result we offer:

1. Superior type tools . . . at low cost.
2. Practical design based upon many years of experience.
3. Correct specifications which insure maximum service.

Your tool requirements in our hands is your guarantee of better tools at a great saving.

SERVICE

Let us quote on your tool requirements. You'll save money . . . even as compared with "home made" tools.

Standard circular form tools for B&B and Davoport Machines carried in stock. Immediate delivery.

COMPLETE ENGINEERING

GEORGE L. DETTERBECK CO., Incorporated 1871 Clyburn Ave., Chicago 14, Ill.
ENGINEERS TO AN INDUSTRY

by the National Machine Tool Co., 610 Wisconsin Ave., Dept. BB, Racine, Wis.

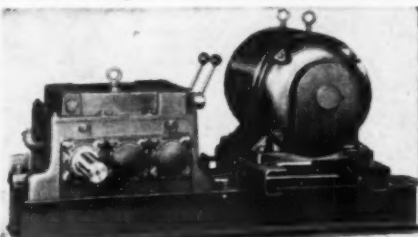
A push or pull on the bar knob sets the device at any position between fully open or fully closed. The locking lever exerts a holding pressure up to 1500 pounds. Full and half scale template sheets are provided by the manufacturer.

3 multi-speed power units

The Turner Machinery Co., 3418 Terrace St., Kansas City 8, Mo., manufac-

turer of power transmission equipment, announces three new models of multi-speed power units for heavier horsepower applications.

Models 2004, 3004 and 5004 are available up to 60 h.p., thus making them widely adaptable; many installations are in connection with internal combustion engines where it is advanta-



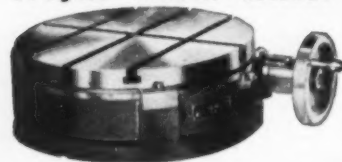
geous to run the engine at a constant speed and vary the output speed with the Turner multi-speed transmission.

All Turner transmissions are available in four speeds with different speed ratios and some models can be supplied with six and nine speeds. Two mounting arrangements are possible—one, RMB, is a vertically mounted arrangement with the motor on a hinged plate directly over the transmission; type H-beam is when the motor is mounted in front of or behind the transmission. The latter has both lateral and longitudinal adjustment.

**Bliss press for piercing
20 mm cartridge cases**

Development of a horizontal piercing press, designed specifically for piercing the flash hole on brass or steel 20 mm

NO MORE COSTLY JIGS
on small production jobs with
Troyke Worm Wheel Operated Tables



Sizes:

9 - 12 - 15 - 18 - 21 - 25

See your dealer or write for Catalog No. 17.

Fully illustrated, showing all models and applications to various work.



Drilling attachments can now be furnished for Worm Wheel Operated Tables.

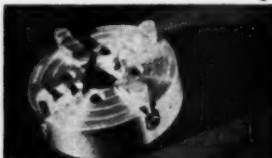
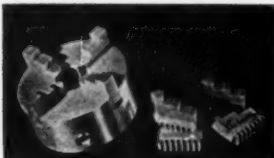
TROYKE MFG. CO.,

Cincinnati 9, Ohio, U.S.A.

- Guaranteed!
- Accurate!

BURNERD CHUCKS

PRECISION BUILT
MADE IN ENGLAND



SELF CENTERING

Nickel Chrome Steel Pinions & Scroll, Semi-Steel Body, Universal Three Jaw, Two Sets of Jaws, Three Pinion

Model	Size	Weight lbs.	Price
28	2 1/4"	2 1/2	\$25.00
29	3 1/4"	3 1/2	26.50
30	4"	6 1/2	30.00
30A	5"	11 1/2	37.50
31	6"	17 1/4	45.00
30BP*	4"	8 1/4	33.50
30ABP*	5"	15	42.50
31BP*	6"	21	50.00
52	7 1/2"	29	57.50
53	9"	43	67.50

GEARED SCROLL

Universal Four Jaw, Two Sets of Jaws, Two Pinion

Model	Size	Weight lbs.	Price
29Y	3 1/4"	3 3/4	\$30.00
30Y	4"	7	32.50
30AY	5"	12 1/2	45.50
31Y	6"	18 1/4	52.50
30AYBP*	5"	15 3/4	48.50
31YBP*	6"	22	57.50

Soft Jaws Available

Models marked with asterisk () are fitted with 1 1/2-8 Back Plate for all popular 9" and 10" lathes.

LIGHT INDEPENDENT CHUCKS

Nickel Steel Operating Screws, Semi-Steel Body, Four Jaw Reversible, Hard Steel Jaws

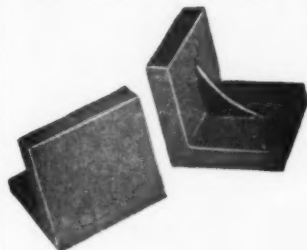
Model	Size	Weight lbs.	Price
35A	3 1/4"	2 3/4	\$12.50
35B	4"	4	14.00
35C	4 1/2"	5	18.50
34	6"	10	22.50
35BP*	4"	6 1/2	18.00
35CBP*	4 1/2"	7	22.50
34BP*	6"	14	26.50

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GRAY IRON ANGLE PLATES MACHINED $\pm .002$ FROM FLAT

2" x 2" x 2"	\$ 2.70
3" x 3" x 3"	3.60
4" x 4" x 4"	4.40
5" x 5" x 5"	8.40
6" x 6" x 6"	10.90
8" x 8" x 8"	16.70
12" x 12" x 12"	45.00

GROUND SURFACE PLATES

12" x 12"	24.50
12" x 18"	29.50



UNFINISHED BACK PLATE CASTINGS FOR CHUCKS

6"	\$1.95	8"	\$5.40	10"	\$9.50
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GRAND TOOL & SUPPLY CO.

174-6 Grand St. WO rth 4-6670 New York 13, N. Y.

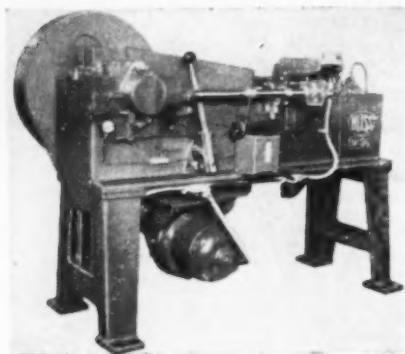
Prices FOB New York City—Order Today.

Dealer Inquiries Invited

We Also Carry
Drills, Taps, Dies, Reamers,
Milling Cutters, Etc., in stock

cartridge cases, is announced by E. W. Bliss, 1358 Raff Rd., Canton, Ohio.

This five-ton capacity press pierces the hole in one case per stroke and



operates at 60 strokes per minute.


The new press is equipped with a

hand-filled chute feed with three stations. The first station is a detector to check the position of the case in the chute, the second is the work station and the third is a detector to check the correct piercing. The first and third stations have solenoid switches to stop the press if the case is loaded improperly or if the hole is not pierced.

Floor space requirements for the press are 30"x64" and weight is approximately 1800 lbs.

Gas, oil burner programming control

Fireye programming control type 26RJ8 made by Photoswitch Inc., 77 Broadway, Cambridge 42, Mass., is designed to provide automatic starting and programming control for commercial and industrial gas, oil, and combination gas/oil burner equipment. It is used with the new Firetron scanner type 48PT1 to protect burner instal-



**EFFICIENT — LOW COST
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MEANS

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PRESSES**

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DETAILS

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SERVICE MACHINE COMPANY

lations from the hazard of flame failure. The control automatically starts a burner in operation and programs a sequence of pre-purge, ignition-on fuel valve delay, post-ignition timing, and post-purge.

Instantaneous response to flame failure results in complete fuel cut-off in two to four seconds. A built-in time delay prevents false shutdown from transient effects such as smoky streaks in the flame or irregular draft conditions. Timing is accomplished through a high torque synchronous motor, insuring positive, accurate sequencing. All contact assemblies make use of over-size contacts and operate with snap action. Cam assembly construction permits programming variations of every type of automatic burner.

Timken turned and bored bar section

The steel and tube division of the Timken Roller Bearing Co., Canton, O., announces a new graphitic steel product which will carry the trade name "Graph-Mo Hollow-Bar." This new product is a turned and bored bar section using for the basic material Graph-Mo tool steel, which the Timken company has been marketing for more than 15 years.

This new product is said to have all of the advantages of graphitic-type tool steel plus the convenience of the hollow bar section in manufacturing ring gages,

dies and other annular tool steel parts.

The material will be stocked in fifteen cities throughout the country and it is planned to have initial stocks ready for distribution in September of this year. Stock sizes will range from about 3" to 16" outside diameter with a variety of wall thicknesses.

DIAMOND HONES



- DOUBLE END 200-400 GRIT
- FREE CUTTING RESINOID BOND
- LIVE AREAS, EACH $\frac{1}{2}$ x 1 x $\frac{1}{4}$
- OVERALL $\frac{1}{2}$ x $\frac{1}{2}$ x 4
- DIAMOND ALL THE WAY THROUGH
- PERFECT FOR TOUCHING UP CARBIDE TOOLS

\$16.50 EA. NET FROM STOCK

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Diamond
Tool Research Co., Inc.
FOREMOST IN DIAMOND TECHNOLOGY

THE "MIGHTY MIDGET" LINE

ORDER DIRECT on 10 day Money Back Guarantee

MIGHTY MIDGET RADIUS DRESSER

7" SIZE
\$34.00

DIAMOND \$7.00



Hardened Shaft, Bearing Adjustable for Wear. Accurate, Adjustable 180° Steps. Diamond always Clamped Perfectly in Center.

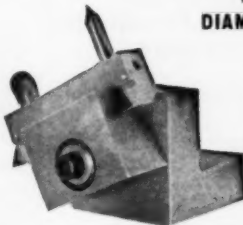
10" Wheel Size for Norton DeAll
\$46.00 with Diamond

Special 14" Size \$89.00 less Diamond

MIGHTY MIDGET ANGLE DRESSER

\$39.00

DIAMOND \$7.00



First low cost high precision Angle Dresser on the market. Can be set very accurately with a protractor. Works underneath the wheel. Large bearing surfaces.

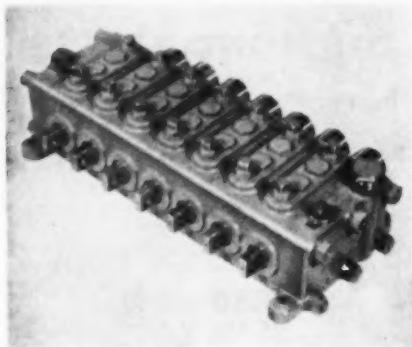
Ball Thrust Bearing. Heat Treated Cast Iron. Guaranteed Accurate.

Please give DO number when possible.

SPERMAN METAL SPECIALTIES • 2199 E. 21st ST., BROOKLYN 29, N. Y.

Sundstrand develops 3/4-inch multiple section stack valve

In answer to demands from the field, a new, larger, 3/4" multiple section stack valve has been developed by the



hydraulic division of Sundstrand Machine Tool Co., 2535 11th St., Rockford, Ill., according to a company announcement.

This supplements the Sundstrand 1/2"

stack valve which has been in use for several years by manufacturers of road machinery, ditching and dredging equipment, excavating machines, industrial tractors, and other types of mobile equipment.

As in the case of the 1/2" valve, the new 3/4" valve is designed for "series" operation, permitting any number of devices to be actuated simultaneously under full or varying load, provided the total load does not exceed the relief valve setting. Thus, on a grader, for example, it is possible to lift both ends of the blade simultaneously. This permits continuous, rather than intermittent operation.

From the standpoint of the operator, the inclusion of a check valve in the body of each section is a guarantee of greater safety. Positive starting and stopping under load is assured. Loads cannot be dropped or shifted as their direction is changed since positive cylinder movement is always maintained and no momentary reversal of the cylinder is possible as the stem is shifted.

LAST WORD
WHEEL DRESSERS
Simplify the Job!

**PRECISION
ANGLE TANGENT TO RADIUS
WHEEL DRESSING**

- Dresses grinding wheel at point of contact.
- Shortens dressing time.
- Simplicity of setting.
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Also Distributors of
SAMSON
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BORING CHUCKS



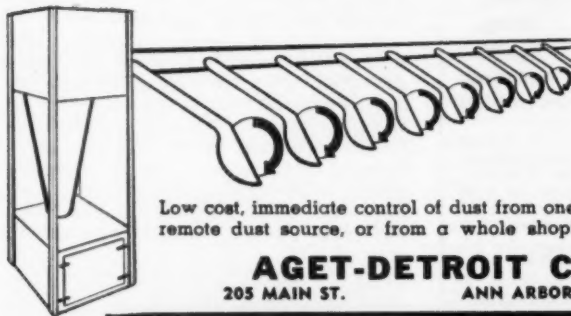
Above: These and countless other forms may be dressed simply with the Last Word Wheel Dresser. Write for Catalog

LAST WORD SALES CO.

18500 MT. ELLIOTT • DETROIT 34, MICHIGAN

STOP DUST

with **DUSTKOP**



Low cost, immediate control of dust from one remote dust source, or from a whole shop!

300 cfm to 10,000 cfm
per unit (22 models)
standard, pre-tested,
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Ask for catalog 605-2.
No obligation.

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205 MAIN ST.

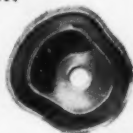
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EISLER CAM JIG BORING • MILLING



A SPECIALIZED CAM
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JIG BORING... SPOT WELDING
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... EXPERIMENTAL
DEVELOPMENT



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RESISTANCE WELDERS SPOT • BUTT • GUN • SEAM

For all types of welding in
sizes: 1/4 to 300 KVA. Foot,
air or motor operated.



*We invite contract spot
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in large or small quantities.*

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762 South 13th St., (Near Avon Ave.) Newark 3, N. J.

**ANOTHER NEW "MASTER TOOL"
THE UNIVERSAL
"MASTERHEAD"**



**ONE
TOOL
ONE
SET UP
... for
boring,
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recessing,
undercutting**

Featuring automatic feeds, end release and return; adjustable stop; adaptable to all standard machines; highest precision; ideal for jig borers; seven models for work up to 24" diameter.

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KARL A. NEISE

381-4TH AVE., DEPT. BB, N. Y. 16, N. Y.

**Suits Your
Grinding
Needs to a**



"T" Square action eliminates usual intermediate table on alternative moving spindle housing. Unusual accuracy and finish are obtained. There are other reasons why you'll like the Crosman "T" Surface Grinder . . . because:

Here's a versatile, handy, accurate surface grinder. Just a few of the uses are: Chip breaker, grinding and sharpening carbide tools, sharpening straight and circular screw machine form tools, also circular file chisels, thread chaser and form surface grinder. Prompt Delivery!

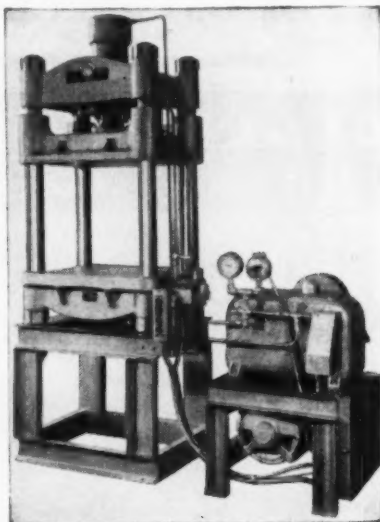
Write for Circular A-2 today.

J. B. CROSMAN & SON, INC.
EAST WALPOLE, MASS.

**Rodgers introduces line of
platen presses**

Rodgers Hydraulic, Inc., 7453 Walker St., St. Louis Park, Minneapolis, 16, Minn., is currently introducing a completely new line of industrial platen presses in capacities ranging from 10 to 500 tons. Known as their "Blue Ribbon Line," these are available with square or rectangular platens, up-acting, down-acting, 90° angle transfer frame and top transfer. Rodgers offers multiple platens for rubber and plastic molding, laminating, metal forming and shaping, die tryouts and utility applications.

According to the manufacturer, the presses are designed to allow maximum deflection not exceeding .0005 inch per inch of span on each of the work platens, when the full rated load is applied uniformly over the entire working area. Heavier construction can be supplied where work requires less than the .0005 inch deflection. Platens are cast steel with heavy bronze bushings riding on



four ground and polished cold rolled steel rods.

All of the presses can be furnished with either single or double acting cylinders. Rams and pistons are alloy steel heat treated, with bronze on steel for all sliding surfaces.

MAKE SET-UPS FASTER

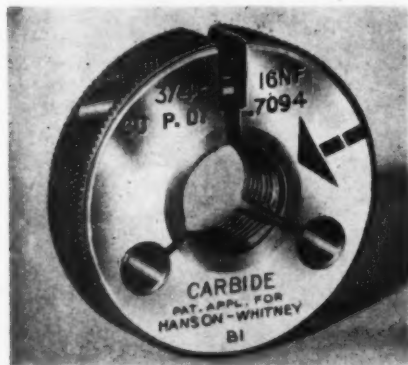
Conserve valuable production time by using the fully universal, easily-operated MASTER MULTI-SWIVEL VISE for intricate, angular set-ups in your shop. 3 swivels instantly set any compound angle. Used in shops throughout the world. Interchangeable platen optional. Write for circular.

DONOVAN MFG. CO.
80 BATTERYMARCH ST. BOSTON, MASS.



Carbide thread ring gages

The Hanson-Whitney Co., Dept. BB, Hartford, Conn., has announced the addition of a complete line of carbide thread ring gages designed for volume



gaging of identically sized threads. These carbide gages are claimed to deliver 30 to 50 times more inspected parts

than regular steel thread rings.

Because of the extreme hardness and wear resistance of the inserted carbide thread segments, the rings maintain their initial accuracy over extended periods of time and through continuous use.

Hanson-Whitney carbide ring gages can be reserviced for wear and may be used as master or reference rings.

"Hairpin" retainer springs

A series of low cost retainer springs of "hairpin" type is offered by the Precision Spring Corp. Dept. BB, 800 W. Broadway, Detroit, Mich. These springs may be substituted for cotter pins, lock-nuts, etc. Retention is obtained by snapping spring into shaft groove.

The series comprises 15 springs for use with shaft groove diameters ranging from $3/32$ " to $15/16$ ". Manufactured of spring steel wire these retainers will stand repeated assembly and disassembly. Springs are carried in stock in unitized packages.

REDUCE DRILL BREAKAGE

... with full length bearing precision bushings, O.D. ground true to I.D. • We specialize in hole sizes #80 to $3/16$ ", in any body size. Other sizes to your specifications. Production small hole drilling, our specialty.

Write for catalog and quotations.

MICRO DRILL GUIDE
AND ENGINEERING COMPANY - Detroit 35, Mich.
P.O. Box 5184, Southfield, Sta.

"DAVIS" KEYSEATERS



are
moderately
priced
Efficient
Economical
Durable

Built in 3 sizes for cutting keyways
 $\frac{1}{8}$ " to 1" width. Circular upon request.

DAVIS KEYSEATER CO.

407½ Exchange St. Rochester 8, N. Y.

Empire LIVE CENTERS

ARE
• ACCURATE • VERSATILE
• HEAVY DUTY



THE TAPERED
SEAT ASSURES
ACCURACY OF
+ .0001

Manufactured in
all tapers. 1 to
6 MT in stock.
Special shanks
and points
made to order.

PAT.
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Points
illustrated
are
standard.

Ask your Supplier or Write for Literature.

ROYAL PRODUCTS

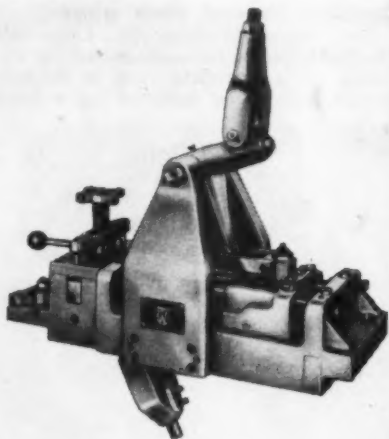
87 UNION ST.

MINEOLA, N.Y.

Cooper Weymouth slide feed

A newly designed slide feed for punch presses said to offer many improvements over old style feeds, that operates off the press crank shaft, converting hand-fed presses to time and labor saving automatic operation, is being made by Cooper Weymouth, Inc., 277 Noble Ave., Bridgeport 8, Conn.

Lighter and stronger heat-treated castings make this feed easy for one man to handle. It can be set to main-



tain an extreme accuracy of feed on long or short runs without overthrows. Ease of setting and adjustment makes it particularly adaptable where a variety of feeds is necessary.

Double feed stops outside the guide rods prevent any interference with the stock. The check roller system of positive stock control incorporates an improved fully-enclosed clutch. A check roller release makes possible fast stock handling without changing the pre-set roller pressure.

The gripper blade, point of greatest wear, has been improved with the addition of a carbide tip. The blade is adjustable vertically for hairline setting

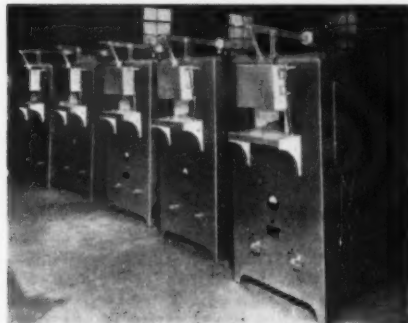
and locks positively, allowing the gripper to be engaged or disengaged without loss of adjustment.

A stock support roller for heavy stock is quickly removable when not needed. The slide feed takes stock up to 4" in width and 5/32" thick with a maximum lead of six inches.

Heat-treating furnace with wide firing range

The Model FG-76 Pereco Heat-Treating Furnace is the latest addition to the improved line of general purpose electric furnaces and kilns manufactured by the Pereny Equipment Co., Dept. BB, Columbus, Ohio. Equipped with globar elements and designed for continuous duty, the FG-76 performs efficiently at all heat levels up to 2500° F., with even higher temperatures available for short or intermittent runs. This eliminates the need for a number of furnaces to acquire a full range of heat-treating temperatures.

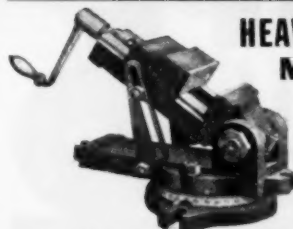
The case construction of the FG-76 is of heavy, gas-tight, electrically-welded steel. The element parts are suitably



gasketed and tightened by means of thumb screws. The manually-operated door, which is also available for air operation, assures a complete brick-to-brick, overlapping, wedge fit against all sides of the furnace opening. A gas curtain attachment and valve are provided as standard equipment.

The valve, located just below the opening, is attached to the door pedal and actuated by its movement so that

PALMGREN ANGLE VISES



HEAVY-DUTY Model

For Quick - Accurate Set-ups

PALMGREN Heavy Duty Angle Vises are built sturdy and rugged for tough, heavy jobs. They are accurately graduated in degrees, can be quickly adjusted to any angle, stay locked under severe service and save valuable hours otherwise wasted in tedious make-ready, wedging or making temporary jigs and fixtures.

Jaws are hardened and ground. Special outstanding features are the ease and opening of jaws—4" jaws open full 4"; the 6" jaws open full 6" etc. with corresponding depth of jaws. Vise can be used as ordinary vise when lowered to horizontal position. Several bases furnished if desired. Sizes 4", 6" and 8" jaws and openings. Prompt deliveries.

Write for Bulletin S-1 "45 Angle Vises" and complete line of PALMGREN Vises.

CHICAGO TOOL & ENGINEERING CO.

Div. of PALMGREN PRODUCTS for over 35 years
808 SOUTH CHICAGO AVENUE • • • CHICAGO

PRECISION WORK AT ANY ANGLE

**ORDER
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Be Sure
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Deliveries

Standardize on

hall COLLET CHUCKS

for
**SPEED,
ACCURACY,
ECONOMY**



Automatic adjustment speeds up production in multiple operations with push-out type HALL COLLET CHUCKS. Full spindle capacity or over.

Tremendous grip over or under stock size to .007—without adjustments. All grip ...no slip. No bearings ...no heat or lost power. Instant release without stopping lathe.

SATISFACTION GUARANTEED!

Made in Two Sizes to Fit Your Requirements:

Model A...1" (max. capacity 1-1/16")

Model B...2" (max. capacity 2-1/16")

Round, square or hexagon collets, plain or serrated

Write today for illustrated catalog and price list

HALL MANUFACTURING COMPANY

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Users say—"HALL IS BEST OF ALL"

"RFC"

ROLL FEEDS

PRECISION FEEDS FOR ALL TYPES OF PRESSES



**COMPLETE
READY FOR
MOUNTING**

Now you can be sure of non-stop, accurately measured feeding (in thousandths) on your punch presses, either bench or pedestal types. Instantly reversed by merely shifting feed finger spring from one lug to the other! Original setting is maintained as there are no ratchets or pawls to wear. Plan to equip your presses with Roll Feeds. Write today for complete list and data.

**EARLY
DELIVERY
ON
STANDARD
MODELS**

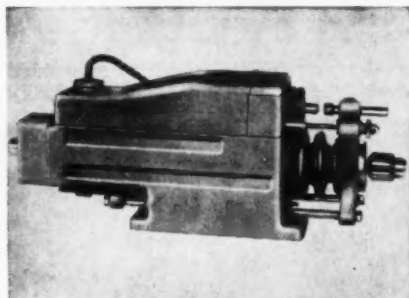
ROLL FEEDS CORPORATION
Pawtucket, Rhode Island
An Electrix Affiliate

the flame curtain ignites as the door is opened and turns off when the door is closed.

The power requirements for this furnace are 15KW, at 220 volts, 3 phase, 60 cycle. The chamber size is 8" wide by 16" deep by 6" high. The overall size is 40" deep by 33" wide by 70" high. This furnace can also be quickly adapted for use in reducing as well as oxidizing atmospheres.

Bellows has sales rights on Locke

Exclusive sales and distribution rights for the Locke drilling and tapping unit have been acquired by The Bellows Co., Akron, 9, Ohio. This is a compact, flexible drilling and tapping machine with a drill capacity from .013" to .250" in mild steel at an air pressure of 80 lbs. Rapid advance and retract are air powered, with feed rate hydraulically controlled. Feed is adjustable from 0 to



three times the applied air pressure. (At a normal shop pressure of 80 p.s.i. thrust is adjustable from 0 to 240 lbs. However, the unit may be operated safely at air pressures as high as 200 p.s.i.)

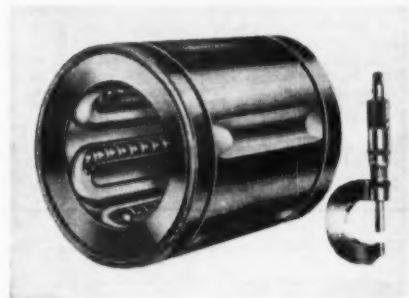
The spindle is electrically driven; spindle speed is adjustable through pulley drive from 0 to 8500 r.p.m. The maximum drill stroke is 3" of which any fractional part may be used at any place within the overall spindle travel. Depth accuracy with the standard mechanical trip is .005", but can be held to .001" with optional electrical controls. These likewise permit controlled dwell and automatic drill cleaning for deep hole drilling operations.

The Locke unit is 3 1/4" wide, 7 5/8"

high, 20 1/8" long and its light weight, 40 lbs., makes it ideal for the construction of economical, space saving special purpose machines.

Heavy duty linear ball bearing

To meet the demand from manufacturers of heavy duty equipment, Thomson Industries, Inc., Manhasset, N. Y., announces the production of a new large size linear ball bearing for use on two-and-one-half-inch diameter shafts. Heretofore these bearings, called ball bushings, have been available only in substantially smaller sizes which were



not suitable for heavy load applications or where extreme rigidity requirements dictated the use of heavy supporting shafts.

This new large size bearing is said to afford an extremely long life of exact precision alignment, as the near zero friction eliminates wear as well as the possibility of binding or chatter.

Their linear freedom is not dependent on the presence of an exposed oil film which, in the case of plain bearings, causes serious trouble when it becomes grit laden and gummy. Also, inaccuracies due to variation in oil film thickness and condition do not have to be considered.

The cost of a combination of ball bushings and round shafts is substantially less than accurately made flat beds or v-ways. This enables designers to make important economies as well as to improve operating characteristics by employing anti-friction support for linear motions.

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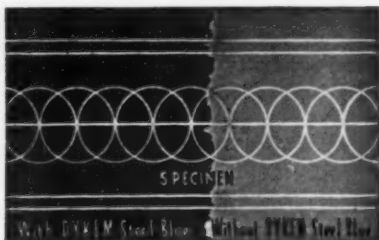
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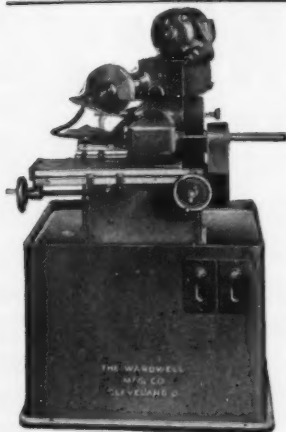
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With the aid of standard gauge blocks or adjustable parallels, wheels may be quickly dressed to any angle from 0° to 90° with assurance that the angles will be accurate within plus or minus 10 seconds.

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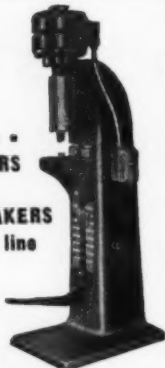
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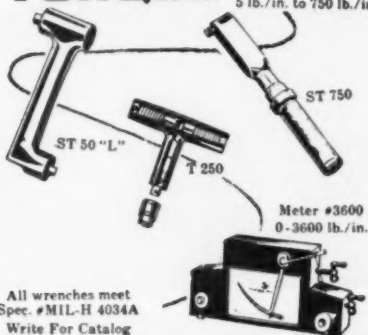
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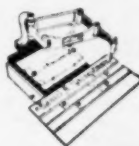


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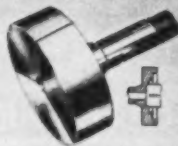
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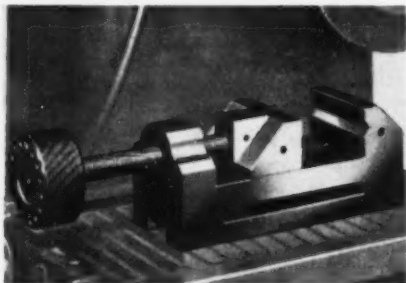
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Erickson gage vise

A highly accurate vise, exact to within
.0003 on five surfaces, is available as
another item in the line of Precision
Holding Tools manufactured by the
Erickson Tools Division, Erickson Steel
Co., 2315-D, Hamilton Ave., Cleveland
14, O.

Erickson engineers developed the vise
as an improved means of rigid, accu-
rate clamping for machining operations
in both production and tool-room appli-
cations.

During recent time studies, it is
claimed the vise has been found to
save as much as two to three hours
in original set-up time for certain



grinding operations. A comparable sav-
ing was realized in milling, drilling,
jig boring and other machine opera-
tions.

In addition, the Gage Vise effects
great savings in time ordinarily re-
quired to remove work from angle
plates and readjustment for subsequent
work. A series of accurate operations
can be performed without once remov-
ing the work from the vise. The ex-
treme accuracy of the vise surfaces
also saves most of the time usually
spent in checking as work progresses.

The range of adaptability of the
Erickson gage vise is especially vast
when it is used in combination with a
sine plate. Otherwise difficult work be-
comes routine with this flexible set-up.

All Erickson gage vises are made of
highest grade tool steel, properly hard-
ened and accurately ground throughout.
The jaw opening is 2 1/2 inches and the

body dimensions are 2½ inches square by 6 inches long. Total weight is 7½ pounds.

Eisler motorized turntable

A motorized turntable for use in production work has been placed on the market by the Eisler Engineering Co., Inc., 762 South 13th St., Newark 3, N. J. This turntable can be supplied with from 6 to 48 positions. This type of equipment can be used for many purposes in various production lines where the requirements are for turn-



ing the work spindle, rotating the spindle, and starting and stopping at various positions where various operations can be placed on the particular spindle in accordance with the requirements.

The index speed can be adjusted with the combination of the timer and adjustable speed pulley from a few seconds to several minute intervals. An additional foot switch can control the index time for any desired length of operating period. The work spindles are either rotating or stationary. The specifications are: Floor space, 40" wide x 40" long x 42" high; approximate weight, 800 lbs.; h.p. required, ½.

6 jaw chuck for D-S grinder

Availability of a new 6 jaw chuck for the D-S radial relief grinding fixture is announced by the D-S grinder division of Royal Oak Tool and Ma-

High Speed COUNTERBORES

BACK SPOT FACERS



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Greenfield Massachusetts

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2, 3, 4-LIP DRILLS

...on one machine!

USE THE
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STERLING DRILL AND CARBIDE GRINDER

With the versatile, easy-to-operate Sterling Grinder, you can grind 2, 3 and 4-lip drills from ¼" to 2½" quickly and accurately. Loaded with new operating features such as simplified adjustment for grinding wheel wear, adjustable clearance angle and permanently mounted diamond wheel dresser. The tilting table with graduated quadrant is ideal for grinding carbide tools for lathes, shapers, planers, boring machines, etc.

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IN
ONE OPERATION**

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Luma
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3469 N. Clark Street • Chicago 13, Ill.

chine Co., 621 E. 4th St., Royal Oak, Mich.

Purpose of the chuck is to permit grinding tools not readily held in a collet or for which no collet in correct size is available.

The chuck is a 4" Buck model specially adapted for the D-S fixture. A shank, precision ground for the D-S spindle, with integral adjustable back

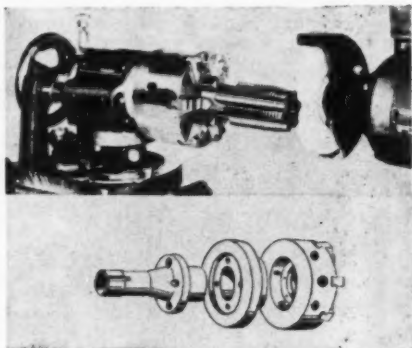


plate has been added to the chuck body. The adjustable feature assures concentricity within .0005" total indicator runout.

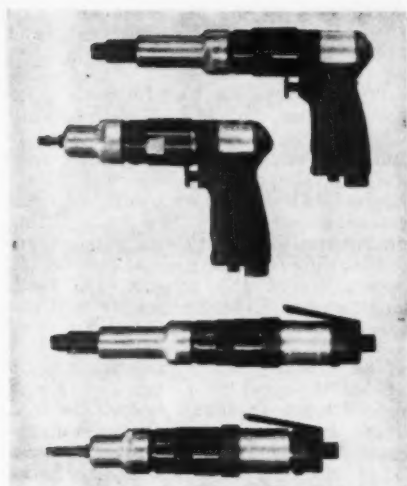
Six hardened reversible jaws centers work easier and quicker without danger of cocking and grips the work more firmly with less pressure than the three jaw chuck formerly offered.

Midget size air driven tools

A new series of midget-size air driven screwdrivers and nut-setters has been added to the Master Pneumatic Tool Co., Inc., Dept. BB, Orwell, O., line of portable air tools.

Used for driving nuts, bolts and screws in all types of assembly and sub-assembly operations, this new series of air tools is rated for driving screws up to size No. 12, and for nuts and bolts up to 1/4" diameter bolt size. Three types of clutch mechanisms are adaptable to three different free speeds. They are 580, 1200 and 2400 r.p.m.

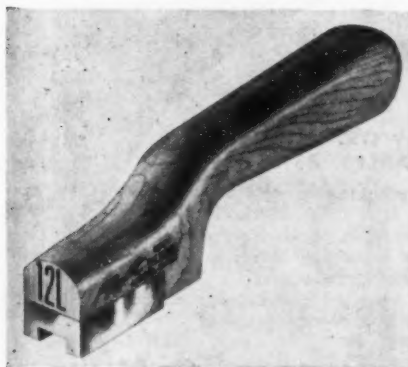
The tools can be fitted with either pistol or lever type throttle handles, and have spindle adapters for both



screwdriver bits and nut socket adapters, providing a total of thirty-six different models. Tool weights range from 1-13/16 lbs. to 2½ lbs., and operate on air pressure of from 80 to 100 lbs.

No skinned knuckles with file handle

A safety file handle, introduced by Remont Mfg. Co., Dept. BB, Lombard,



Ill., is said to outlast up to 20 ordinary handles.

The tough, soft-alloy steel V-blocks are dove-tail cut to allow "upset," so

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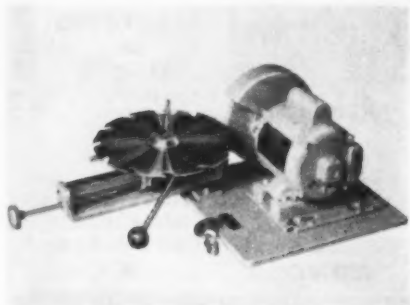
1804 W. BELLE PLAINE AVE.
CHICAGO - 13 - ILLINOIS

that variations in the tangs of files will be compensated.

Files should be driven into the V-block until completely wedged. The offset handle prevents skinning the knuckles.

Hanchett circular saw sharpener

Said to be the first American made machine of its kind, this new cam-



actuated circular saw sharpener is being

introduced by the Hanchett Mfg. Co., Dept. BB, Big Rapids, Michigan, and Portland, Oregon.

Designed by Hanchett for wide tooth spaced saws (safety type), the "Easy Cut" circular saw sharpener accurately generates the correct tooth shape with uniform, sharp, clean saw teeth. Precision built by the world's largest manufacturer of saw and knife fitting machinery, this balanced unit has many outstanding features such as cam action, generation of the proper saw tooth lengths and shape, uniformity and accuracy.

The capacity is for saws from 6" to 24" in diameter and the unit has a special 1/2 h.p. capacitor motor. The feed finger is spring actuated and adjustment for saw hook is provided from 0° to 30°. Saw bushings in sizes from 1/4" to 2" diameter are included together with the Hanchett Red Anchor grinding wheel and wheel guard. This new machine also performs efficiently as a hand gummer.

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Adjustable!

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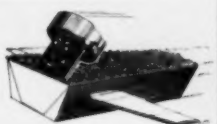
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For example you can drill multi-diameter holes and countersink or chamfer in one operation. Each tool is made special for the job to be done. Shown below are just a few of the special cutting tools which we make. Hundreds of other combinations to save you money.

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SPIRAL STEP TOOL CO.

5402 N. DAMEN AVE.
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CUTTERS



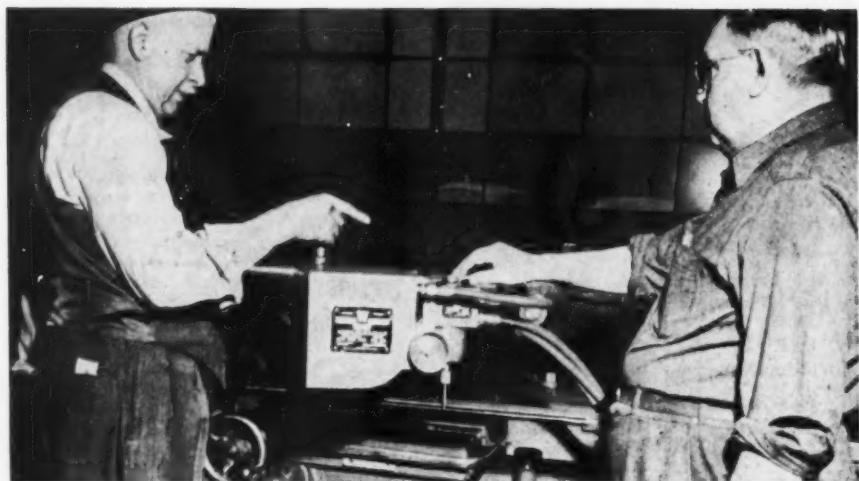
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Three Sizes

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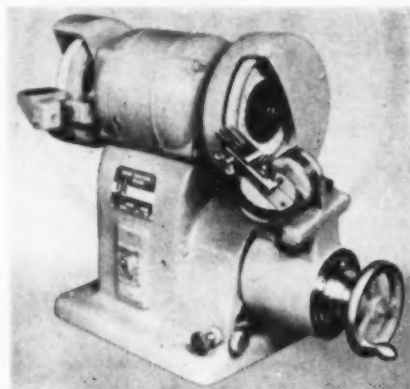
T. H. LEWTHWAITE MACHINE CO.
312 East 47th Street New York 17, N. Y.



C. E. Walker, left, president of the Walker Duplicator Co., Standish, Mich., and Chris Drott, general superintendent, the Nebel Machine Tool Co., Cincinnati, discuss a new hydraulic duplicating attachment which the Walker company has designed and is now producing for Nebel. It is said to be fast and accurate and capable of using the full speed and power of Nebel lathes.

Bench type chaser sharpening machine

Specifically designed to resharpen chasers, this space saving machine al-



lows you to free heavy expensive machine tools for their intended uses, and at the same time do a better job of

chaser sharpening. It is being made by Jones & Lamson Machine Co., Dept. BB, Springfield, Vt.

Equipped with the new J & L chaser grinding fixture and adapters, an outstanding job is claimed on all sharpening operations, for both tangent and radial die chasers. Adapters for J & L chasers are available from stock, while adapters for other chasers can easily be applied to the J & L chaser grinding fixture.

This machine will duplicate desired grinds repeatedly. It is a precision machine tool equipped with all necessary stops and controls. Simple, direct methods speed up the operation and cut costs. Even an inexperienced operator can, in a few minutes, learn to resharpen chasers on this machine.

True-Point centers in regular or tube

Spendrup, Inc., 37 Wall St., Dept. BB, New York 5, N. Y., announces both

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Threaded Plastic Balls
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Cast Iron Hand Knobs, Three Styles

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13 COLORS

For Tool, Die, Pattern or Template layout on
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**PORTABLE
ELEVATING TABLE**



**Saves
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**YOU'LL BE
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at the extremely low
first cost and the vitally
important jobs that this
little precision machine
can do. It will pay you
to get our accuracy in-
formation on this ma-
chine which has 6"x10"
table movement and 7"x
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Full Information*

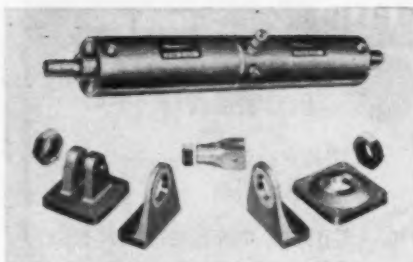
**LINLEY BROS.
COMPANY**
663 State St. Ext.
Bridgeport 1, Conn.

regular and tube centers in their True-Point live centers, featuring a true center ground in place, adjustable SKF ball and roller bearings, with point, housing and shank hardened and ground. The tube center, with double rows of SKF roller bearings, takes tube sizes up to 6½" diameter. All parts are said to be carefully proportioned and designed for vibrationless performance under heavy load, high speed or long runs.

Modernair air hydraulic cylinder

Modernair Corp., 400 Preda St., San Leandro Calif., announces its latest development in the field of industrial pressure-operated devices, an air hydraulic cylinder. Two bore sizes are presently available as standard—two and three inch. Other sizes on special order.

This cylinder features interchangeable mounting brackets, a feature of the other Modernair air and hydraulic



cylinders. Standard shop airline pressure is utilized to actuate the cylinder, while the built-in hydraulic system furnishes positive regulation of forward or reverse stroke movement by adjustment of speed control.

This cylinder is suitable for powering tools or work in machining operations, to permit rapid traverse (if skip feed by-pass is used), finely controlled movement during work operation, and fast reverse action. A flush interior permits installation in restricted space. The hydraulic control gives smooth action.



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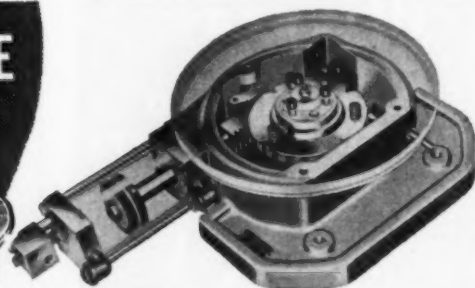
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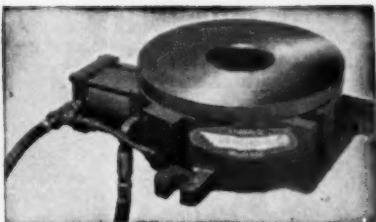
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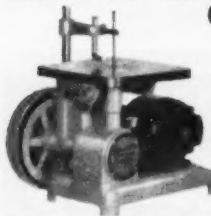
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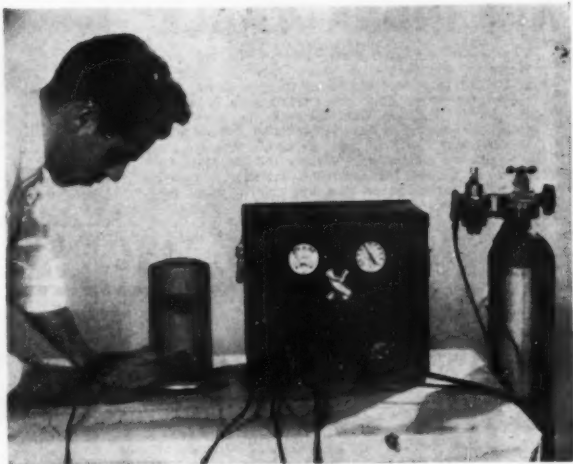
Write for Complete Details

RICE PUMP & MACHINE CO.
224 N. 12th Ave. Grafton, Wisc.



Abrasive cutting

Cutting by means of a high-velocity stream of gas-propelled abrasive particles, the newly developed "Airbrasive" unit of the S. S. White Industrial Div., 10 E. 40th St., New York, N. Y. is said to provide a fast, accurate method of doing a number of high precision operations, including controlled removal of metallized films from glass and ceramics, drilling thin sections of hard-to-work materials, cutting extremely hard or brittle materials, etching, light deburring and polishing. The unit is expected to find important applications in jewelry manufacturing and in the electronics, glass, ceramics and precision metal working industries.



The abrasive unit in action. The cylinder at the right contains the propellant gas. The operator holds a right-angle handpiece. For production operations with fixed positions a straight nozzle would be used. The action of the unit is controlled by a foot switch.

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Chandler-Duplex

In operation, the "Airbrasive" unit directs a gas-propelled abrasive stream against the work surface through a sintered tungsten carbide nozzle. As it leaves the nozzle the stream travels at approximately 1100 feet per second and is only .018" in diameter. As a result, extremely fast and accurate cuts can be made.

The "Airbrasive" process is claimed to have a number of advantages over standard rotary cutting tools.

The cutting action is accomplished without the usual increase in temperature and without the pressure and vibration ordinarily experienced with other cutting methods. This has been found to be of particular significance when working on materials such as germanium, whose physical or electrical properties might be affected by heat and shock.

Another advantage is that there is no direct contact of a tool with the work. This eliminates dimensional variations that might set in due to wear of

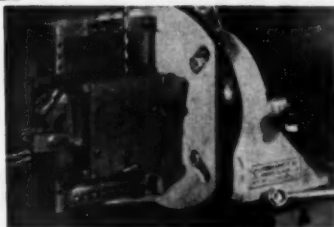
the cutting tool or by surface irregularities in the work.

On certain jobs and materials, the "Airbrasive" process is much faster than other cutting methods, including diamond tools. Despite the ease with which it cuts hard and brittle surfaces, the "Airbrasive" unit has practically no effect on resilient or soft materials, such as rubber, cloth and certain types of plastics. Likewise, it will not damage skin tissue, should the operator accidentally put his hand in front of the abrasive stream. This selective cutting effect has been found most useful in removing metallized films coated on a relatively soft base.

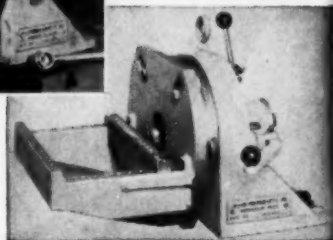
Normally, a specially processed aluminum oxide powder is used as the abrasive. For certain applications which require a lighter abrasive, a classified Dolomite, a mixture of calcium and magnesium carbonates, can also be supplied. Standard commercial grades of abrasive are not suitable.

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Thor has new line of pneumatic tools

A completely new line of lightweight Thor pneumatic drills, screwdrivers, nut setters and grinders, has been announced by Independent Pneumatic Tool Co., Dept. BB, Aurora, Ill.

With 85 different individual sizes




catalogued, ranging in weight from a 1 lb. 1 oz. grinder to a 2 lb. 11 oz. angle screwdriver, the new Thor No. 2 class

tools feature a new interchangeability of housings, handles and attachments that will facilitate quick delivery of any service in the line.

In addition to parts standardization for ready assembly and low-cost maintenance, the new line features a completely new rotary air motor providing maximum power output at standard air-line pressures.

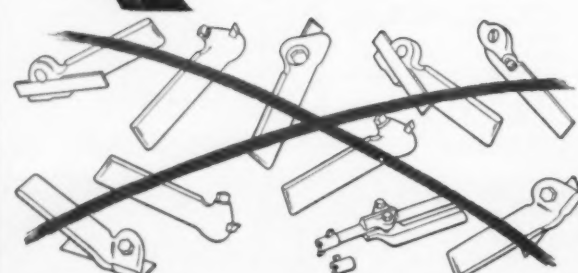
Thirty-one sizes are featured in the new No. 2 drill line, including angle attachment models in 30°, 45° and 90° along with the straight models, and choice of offset (pistol) grip, button or lever throttle, and optional chuck or collet. Speeds range from 850 r.p.m. to 14,000 r.p.m. for drilling in aluminum, with a total of nine different speeds available.

No. 2 class screwdrivers and nut setters number 48 sizes, 28 of them angle types, in 25° and 90° models. A complete range of direct drive or slip clutch attachments, with offset or lever throttle



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ONE tool holder for all positions . . . No tool chatter . . . can do internal boring or internal threading . . . Ideal for carbide tools . . . Bit sizes: 1/4", 5/16", 3/8", 1/2", 5/8".

ACME TOOL CO.
73 WEST BROADWAY
NEW YORK 7, N. Y.

handles makes up the line. The new "drivers" will handle up to No. 12 wood screws and 1/4" machine screws or nuts.

Roto-Finish develops separator compounds

The Roto-Finish MMG 34-12, a combination mechanical magnetic separator, made by Roto-Finish Co., 3715 Milham Rd., Kalamazoo, Mich., is especially designed to separate parts from Roto-Finish abrasive chips where both ferrous and non-ferrous parts are processed using Roto-Finish methods. The unique feature of the Separator is that the magnetic and mechanical separating mechanisms are interchangeable on the portable frame. As a result, it can be used either as a mechanical or magnetic separator.

Operation of the separator is simple. A hoist pan containing the mixed parts and processing media is placed on the incline loading support of the separator. When used for mechanical separations the mixed mass passes over a motor driven, agitated separator screen. Separation is made as the oversize parts are



discharged from the top of the screen, while processing chips go through the screen and discharge into a hoist pan below. The amount of agitation is controlled by a variable stroke adjustment.

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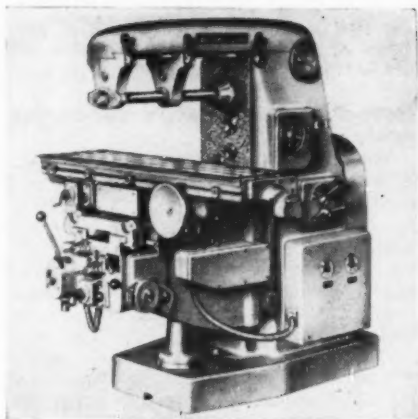
Screens are available in mesh sizes of 1/16" to 1 1/2" and correspond to Roto-Finish chip sizes. Screen size is 34" x 27".

There are several new additions to the Roto-Finish line of compounds used in the Roto-Finish processes for finishing a wide variety of metal parts.

In general, Roto-Finish compounds furnish lubrication for processing media and parts being finished. Also they maintain cleanliness of processing media and compartments. Other important characteristics prevent tarnishing, etching or rusting of parts processed.

Columbia Export milling machine

A milling machine of universal design is being introduced by the Machine Tool Division of the Columbia Export Co. Inc., Dept. BB, 501 Fifth Avenue, New York 17, N. Y. It has a table size of 64"x14", power-feed in all directions and an automatic longitudinal travel of 48". It is equipped with a 15 h.p. motor and features single lever control. The machine can be



equipped with a vertical head attachment, a universal divider, a universal miller and a vertical slotting attachment.

All shafts of the main gear box on this heavy duty machine run in tapered roller bearings that are self-lubricating.

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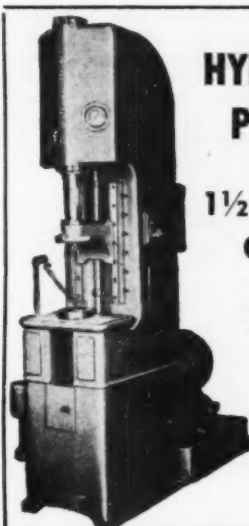
Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

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*Pictured: a 38-Spindle Heavy Duty
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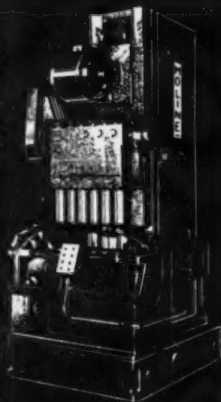
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Diversimatic centerless grinder

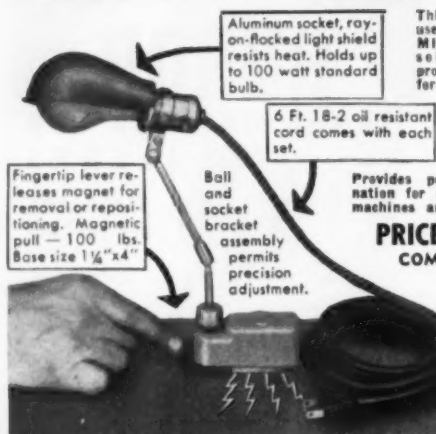
The Diversimatic No. 1 centerless grinding machine (formerly known as the Promatic No. 1) is now superseded by new model No. 1-R, a machine of greater capacity and of superior design, it is said. The capacity of the new model has been increased to accommodate stock diameters of from 0", to 1½". Due to its increased ruggedness and capacity, the machine is now recommended for operation with 5 h.p. motors only. It is being manufactured by Diversified Metal Products Co., 5125 Alcoa Ave., Los Angeles, Calif.

A complete line of accessories is now available for any type of centerless grinding operation including automatic air operated stock ejectors, outboard roller support attachments, toggle cam devices to provide greater width of opening between wheels and automatic cycling attachment for infeed grinding. When this attachment is used in con-

junction with a hopper feed arrangement, the Diversimatic becomes an entirely automatic machine requiring only



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No. 500	Portable Demagnetizer	\$10.50

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occasional adjustment for wheel wear.

The machine features a massive grinding wheel spindle supported by super-precision roller and ball bearings which combine to produce a cool running spindle that never requires pre-operating warm-up in order to hold size tolerances. Guaranteed to hold a tolerance of .0002" or better, the machine is equally proficient in the grinding of steel, non ferrous metals, glass, brass, porcelain and plastic compositions.

Portable coolant system

A simplified coolant pump and motor assembly, which, when immersed in a pail or other container of coolant, becomes a complete coolant system, has recently been introduced by Factory Tools, Inc., 4706 W. Arthington, Dept. BB, Chicago 44, Ill.

The unit's built-in, high volume vane type pump, driven by a fully sealed 1/30 h.p. motor, delivers a steady stream of coolant or oil through the four ft. long semi-rigid flexible metal



hose which is equipped with a variable volume nozzle.

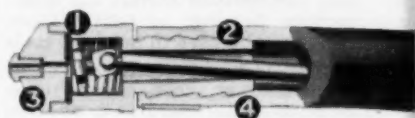
Supporting legs of the unit are threaded to permit height adjustment of the pump and motor for the container and the coolant level. The legs are angled out to provide a stable support for the assembly.



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In machine shop and foundry wherever chips, dust, dirt and surplus material must be removed Air-O-chek air guns do the job quickly and economically. Repeat orders literally by the thousands prove to us that Air-O-chek customers are satisfied customers. If you try 'em you will buy 'em.

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1. Valve completely enclosed. Eliminates Packing Glands.
2. Slight movement of lever gives complete discharge.
3. Unscrewing head makes all moving parts accessible for servicing.
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PLUS THESE . . .

- Leakproof
- Streamlined to hose — No protruding levers or buttons.
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- Unlimited adaptability—Many methods of application in machine shops, etc.
- Instant, positive shut-off.
- Simple design — Few moving parts.
- Low maintenance—Little to wear.
- Made to precision standards of bar brass and stainless steel.

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AIR-WAY PUMP & EQUIPMENT CO.
1054 N. Kilbourn Ave. Chicago 51, Ill.

Wax-type metal cutting oil developed by Johnson

A wax-type cutting oil called "Wax-Cut" which greatly improves metal cutting action and results in a marked reduction in tool wear has been developed by S. C. Johnson & Son, 1525 Howe St., Racine, Wis.

The new lubricant is designed for use in automatic screw machines, gear cutting machines, broaches, lathes, and other types of machine tools which use oil-type cutting fluids.

The reduction of heat when using "Wax-Cut" also means less smoking and wasteful loss of cutting fluids through burning and atomization, the manufacturer says. The new product is free of all chemically active additives such as chlorine and sulphur. It will not stain non-ferrous metals nor damage machine bearings or gear mechanisms and may be used in machine tools using a universal lubricant.

Golden clean in color, the Johnson product enables the operator to observe

the progress of his work through the fluid. Without odor, it will not turn rancid.

Flexible couplings for speed reducer, electric motor shafts

A line of Cone-Drive standard bore couplings for Cone-Drive worm shafts, Cone-Drive gear shafts and electric motor shafts is announced by Cone-Drive Gears Div., Michigan Tool Co., 7171 E. McNichols Road, Detroit 12, Mich.

Cone-Drive flexible couplings are a gear type with seven parts: A sleeve, two hubs, two neoprene seals and two snap rings. This design is easily disassembled and is sealed to keep weather out and lubrication in. The hubs and sleeve are SAE 1045 steel forgings with 90,000 p.s.i. tensile strength. The couplings allow an average of 3 deg. angular misalignment and 1/16 in. offset depending on size.

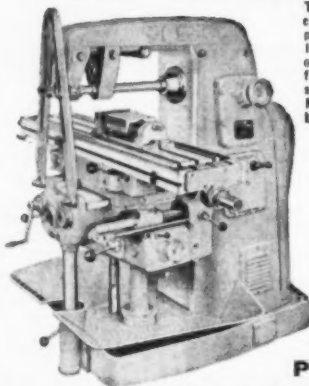
The standard couplings are made in 22 bore sizes from 3/4 in. to 6-1/2 in.

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PRECISION MILLING MACHINES FOR TOOLROOM & PRODUCTION WORK



These HERCULES No. 2 Milling Machines have hardened and ground gears, power rapid traverse in all directions, 12 spindle speed and feeds, separate oil circulation for main gearbox and feed gearbox, motor in the base, spindles have No. 50 Standard Milling Machine Taper. Knee rigidly supported by round outboard sliding column.

Work table overall
12" x 51"

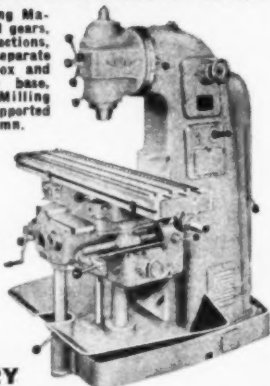
Automatic long feed in
32

Spindle speeds R.P.M.
40-900

Main Motor H.P.
5

Feed Motor H.P.
1

Net weight
3,350 lbs.



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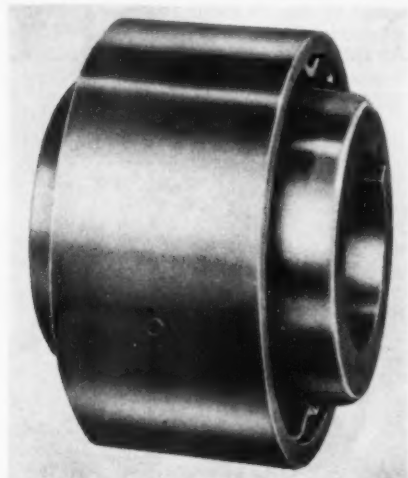
Full details will be sent upon request



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diameter with capacities from 4 to 550 h.p. Other designs of Cone-Drive cou-



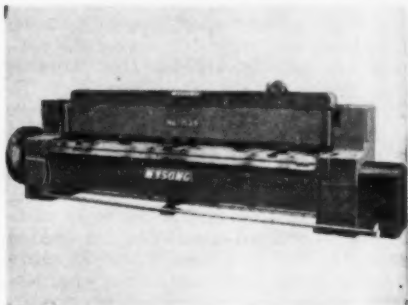
plings including mill motor, spacer, vertical shaft and floating shaft types

can also be had in a variety of bore sizes from 3/8 in. to 6-5/8 in. diameter.

Larger sizes and special types of Cone-Drive couplings will be furnished by the company on request.

Wysong squaring shears

A new series of 1/4" power squaring shears in 4, 6, 8, and 10 feet cutting



lengths has been announced by Wysong and Miles Co., Greensboro, N. C.

Construction is from massive, hi-



SELLEW (Standard DRILL HEADS)

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In stock for immediate delivery.

No. 0AD min. .65" max. 3.4" — 1/8" drill

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tensile castings; back gauge is ball-bearing, precision, adjustable to .0078 (1/128th) of an inch by front operated handwheel. The holddown action is by roller and cam action. Individual compression springs in each holddown foot compensate for varying thicknesses in metal being sheared. The clutch is jaw-type.

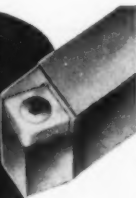
A full length open space between holddown and knife-bar makes the cutting line clearly visible. The operator can easily cut to a scribed line. To insure accurate shearing, surfaces where end frames and bed join are hand scraped for perfect bearing. In assembly, bed is squared in all directions. The knife bar is a massive, well-ribbed, one-piece casting. Bed is one piece casting with cored-pockets for added strength. To give accurate measure from cutting line, adjustable stainless steel scales are embedded in various positions on the surface of the table.

KENNAMETAL CUTTING TOOLS

for Increased
Productivity



KENNAMETAL Inc LATROBE, PA.
CEMENTED CARBIDE TOOLS,
BLANKS, MILLING CUTTERS



Reversible wheel adaptor

A reversible wheel adaptor has been added to the products produced by the accessory division of the Detroit Milling Cutter Co., 28625 Grand River Ave., Dept. BB, Farmington, Mich.



When the wheel wears on one edge, as from grinding forms or chip-breaker grooves, it can be reversed on the spindle without the delay and expense of re-truing the wheel. The adaptor stays mounted on the wheel at all times.

Not only is this adaptor invaluable for diamond wheel usage, but on any formed or angular periphery type surface grinder wheel it permits quick and accurate wheel reversal for grinding left and right hand tools or parts. It saves set up time on intermittent wheel use.



ETALON No. 9 37.³⁰

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.001"
and
1/64"

HARDENED STAINLESS STEEL

Overall Length 10". Measuring Capacity is 7".

Width of Nibs when closed is 1/4".

Known the world over for fine accuracy. Hand fitted vernier assures smooth, snug operation. COMPLETELY GUARANTEED. Furnished in handsome form fitting wooden case.

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NEW YORK 13, N.Y.

Canadian firm redesigns shell-turning lathes

The Williams Tool Corp., Brantford, Canada, represented in the U. S. by Four States Machinery Co., 5304 W. Chicago Ave., Dept. BB, Chicago 51, Ill., and 606 W. Wisconsin Ave., Dept. BB, Milwaukee 3, Wis., announces a redesigned line of shell-turning lathes for the manufacture of artillery shells from 75 mm through 8".

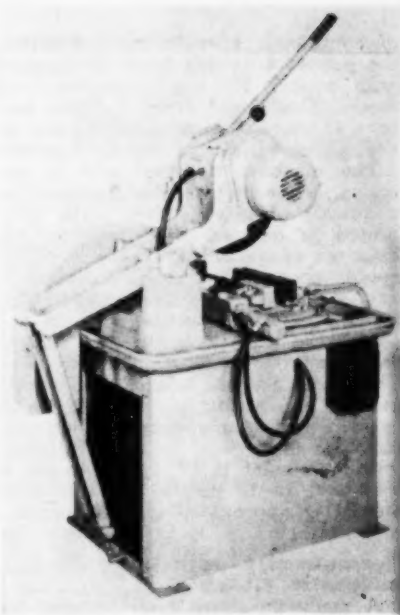
Lathes for centering, rough turning, nose boring, finish turning, band grooving, base facing, and band turning are also available.

The Williams Brantford lathes feature heavy bed and headstock construction; spindle driven through worm and worm wheel gearing; self-contained hydraulic automatic feed cycle and accessibility of components for service.

Stone has heavy-duty cut-off machine

The Stone Machinery Co., Fayette St., Manlius, N.Y., has announced the M75, heavy duty cut-off machine.

Designed to meet the requirements





BE SURE THEY'RE SAFE



TYPE C GUARD

Two other types available

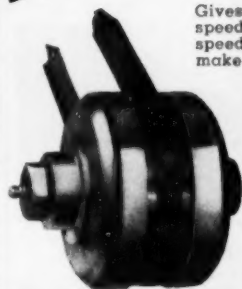
1. Increase production by giving greater protection. Eliminate costly accidents.
2. Easily attached to the press, or removed from the press by means of two mounting brackets.
3. Laminated Safety Glass Front protects the operator at all times and gives complete visibility without reflection or discoloration, such as is encountered with plastic type shields. Guard can be furnished with or without Laminated Safety Glass Front. Glass can be easily replaced if necessary.

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Gives infinite variable speed with constant speed motors and any make of standard V-belt.

Maintains constant speed at any speed setting. Load carried by positive contact between cam and cam track, exclusive HI-LO feature.

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2851 Columbus
Minneapolis, Minnesota

of continuous heavy duty production, the powerful cutting head is equipped with a full 7½ h.p. geared-in-head motor. This direct drive, a Stone feature, insures delivery of full power to the cutting wheel with no loss of power.

The machine is fitted with a fast acting, self-centering vise mounted on a quickly adjusted swivel plate, calibrated in degrees. This provides for least arc of contact with work and for speedy change from straight cutting to any desired angle up to 46°. The balance of the machine head is accomplished through spring load control rather than counter balancing weights. This model also can be furnished equipped for wet cutting.

The wheel spindle speed is 2500 r.p.m. and the arbor size is 1". Maximum wheel diameter is 16". Floor space is 2½" x 4', or 10 square feet. Shipping weight is approximately 900 pounds.

Permanently adjusted magnetic clutch

A magnetic clutch manufactured by



Patented

Surface, Lapping, Angle Plates
(As Above)

Double Deck Parallel Straight Edges, all sizes.

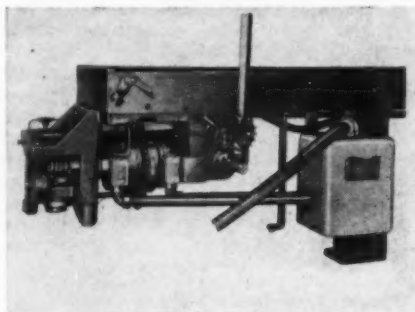
"Positively No Jobbers at this time."

TATRA TOOL CO.

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Wire us and we phone you at our convenience.

the Peerless Machine Co., 1602 Junction Ave., Racine, Wis. is claimed to be remarkably simple in construction and operation, with only three major parts. These are the constantly-rotating center clutch plate (driven by chain from the lower transmission shaft) and



two armatures, with which it is alternately engaged. One armature controls movement of the stock feed conveyor—the other operates the vise which clamps the work during the sawing cut.

The clutch embodies a new principle which assures fast engagement and smooth machine operation. Solenoids and mechanical linkages are eliminated. When either magnet coil is energized, the armature disc and the rotor plate are instantly attracted, and then drive through friction in full, positive magnetic couple. No clutch adjustment or other attention is required during the life of the equipment.

Peerless Mechani-Cut machines equipped with the stock feed conveyor will automatically saw desired lengths from bar stock, pipe, tubing, squares, channels, I-beams, web sections, heavy billets and other forms of stock. These can be fed singly or nested to the capacity of the machine.

The Peerless automatic feed conveyor is available for Mechani-Cut hack sawing machines in 7 x 7 in. and 11 x 11 in. capacities. Conveyors can be furnished in 12 ft., 16 ft. and 20 ft. lengths. The automatic feed will operate accurately in lengths from as small as 1/8 in. up to 24 in. or 48 in.

SET OF 14 Nicholson Mandrels

Takes Every Size Bore $\frac{1}{2}$ " to 7"



Actually 209 solid arbors would be required to fit all bores between $\frac{1}{2}$ " and 7", advancing by $\frac{1}{32}$ ". But 14 Nicholson Expanding Mandrels will accommodate this entire range, and all in-between sizes as well. Hardened tool steel. Sold singly

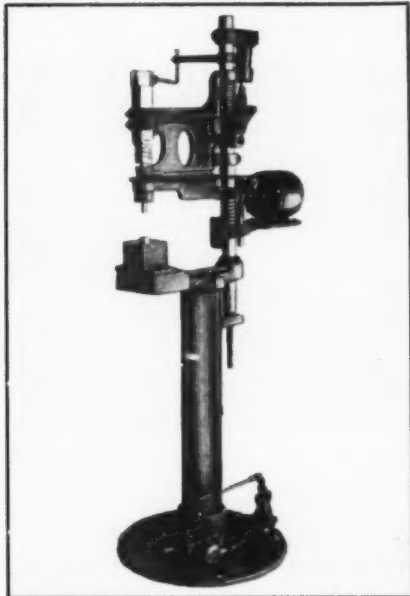
or in sets. The standard in shops the nation over.

BULLETIN 750 shows how to save time, promote precision with these widely used tools.

117 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS



Riveter force, speed can be regulated

The Lemert Eng. Co., Plymouth, Ind., manufacturers of pneumatic tools, announces the introduction of a new improved model to its line of Airflex pneumatic riveters. Incorporating a new spindle designed to minimize impact noise, the improved model features a rotating hammer, blows of which can be carefully regulated as to force, rapidity, and duration, depending on the job.

According to the manufacturer, these combined features—rotation plus control—make Airflex equipment especially desirable on precision jobs involving fragile materials or slender, unsupported rivets.

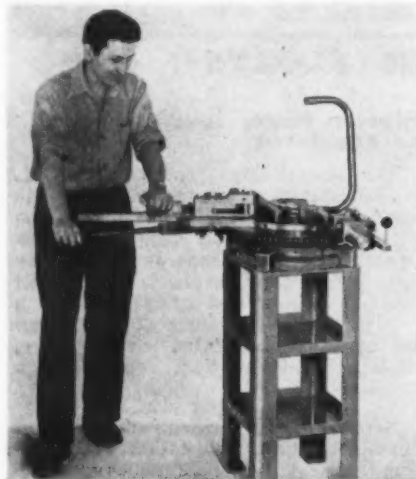
Equipped with an air timing valve, the riveter goes through a cycle of operation in response to the touch of a foot pedal. The time valve may be set for a series of impacts ranging in duration from $\frac{5}{10}$ second to any designated length of time.

Hand-operated bender for radius to 12"

A hand-operated bending machine which bends to one inch diameter cold finished steel bar and 1½" tubing or their equivalents has been added to the Di-Acro line of precision metalworking machines manufactured by O'Neil-Irwin Mfg. Co., 314 Eighth Ave., Lake City, Minn.

Di-Acro Bender No. 4 is designed for heavy bending operations where production does not warrant a power driven machine. It offers a radius bending range from 0 to 12".

A feature of the machine is a built-in ratchet mechanism which can be engaged or disengaged by the operator, depending upon the size of the material being formed. Engaging the ratchet mechanism increases the material capacity of the bender—larger and heavier size material can be bent—and multi-



plies the operator's effort by approximately four times.

By disengaging the ratchet—operating the bender in direct drive—the operator can step up the production of lighter materials.

Water soluble coolant

A water soluble coolant for honing has been developed by Pelron corp.,

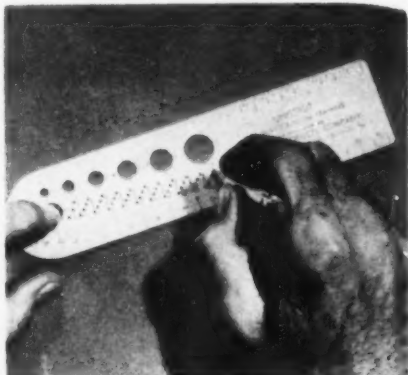
7740 West 47th St., Lyons, Illinois. Pelron No. 560, is said to facilitate the removal of stock and eliminate many of the customary problems involved in the use of kerosene and sulfur base oils used with kerosene.

The development of a coolant combining the heat dissipating qualities of water with the cleansing and anti-rust qualities of kerosene was sought. Previous water soluble coolants were found to require increased operating pressures which produced excessive heat. This heat caused out-of-roundness, taper, loading of stones with graphite paste, steam which produced rust and poor stock removal. Pelron No. 560, containing a high percentage of liquid detergent, an extreme pressure agent, and a rust preventative, is said to eliminate these.

Unistrut "Circ-L-Scale"

A new and useful device is being offered free on request by Unistrut Products Co., Dept. BB, 1013 W. Washington Blvd., Chicago 6, Ill.

Called the "Circ-L-Scale," and approved by the American Society of Industrial Engineers, it is a combination



compass, scale, square, protractor and lettering guide. It is small, handy, and durable, and made of vinylite because of the low coefficient of expansion. On the reverse side are temperature conversion table, decimal equivalents, tap and drill scale, and a metric rule.



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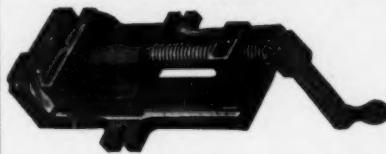
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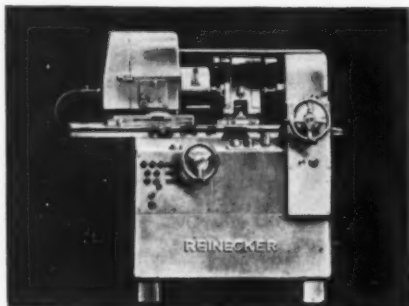
HEIMANN MFG., CO. • URBANA, OHIO

Internal, face grinding in single setting

Internal and face grinding operations are performed in a single setting of the workpiece, in the Reinecker Model JSOP grinding machine, being distributed by Kurt Orban Co., Inc., 205 E. 42nd St., New York, 17, N.Y.

Combining both operations in one set-up, it is claimed that this reduces rechucking and centering time, assures a ground face which is true to the bore, and increases output.

Operation is by single lever control for rapid travel, grinding movement,



work spindle rotation and coolant flow. Chucking of the workpiece is done by magnetic, collet or three-jaw chucks.

Semi-automatic wheel redressing gives uniform accuracy for large quantities of workpieces. Precision angular adjustment enables the grinding of inside tapers up to 300; the grinder provides hydraulic, infinitely variable table movement, grinding wheel infeed and hydraulic movement of the face grinding bracket, which is adaptable for cup- and face wheels. Working range: Bores from .16"-3" diameter; Maximum grinding depth, 5"; Max. face grinding diameter, 9". The machine is also available without face grinding equipment as Model JSO.

Heald Bore-Matic for clutch plate production

A vertical spindle, cam-operated, three-station Bore-Matic has been de-

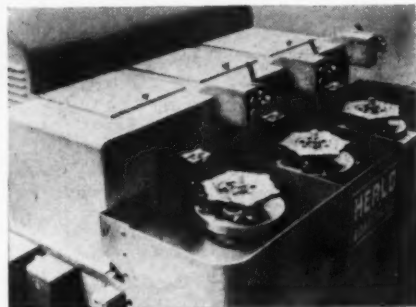
veloped by The Heald Machine Co., Dept. BB, Worcester 6, Mass.

Model 243 is designed to provide multiple precision facing and step facing operations on clutch plates, bell housings, flywheel assemblies and other similar parts. The three stations may be set up for simultaneous or progressive production runs and loading on any station may be done with others operating.

Also available for similar high production operations on a smaller scale are the Model 241 single-station and Model 242 two-station vertical spindle Bore-Matics.

Cams operating the tool slides control the cutting speed of tools as well as the stroke, making a wide range of machine cycling available.

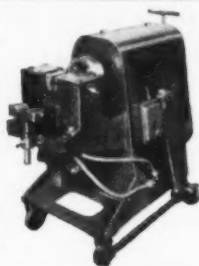
Tool adjustment is easily accomplished by setting index marked screws



on the top of the tool blocks and may be done while other stations are operating.

The rotating air operated fixtures are mounted on vertically positioned boringheads with fixture clamp levers adjacent to each push button control station.

Chip removal is simplified by a worm or screw type conveyor which gathers chips at the base of each station depositing them in a pan at the right side of the machine. Guards around the tool slide prevent chips from entering the cam operating section and access doors at the top facilitate periodic inspections.



for chamfering bar stock
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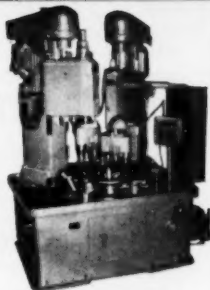
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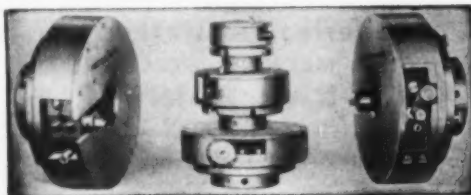
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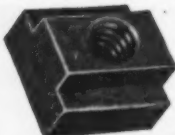
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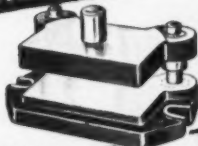
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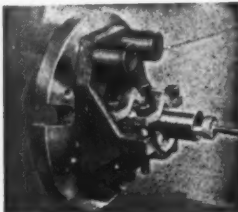
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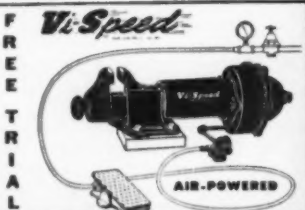
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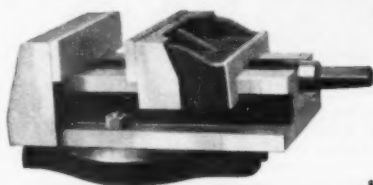
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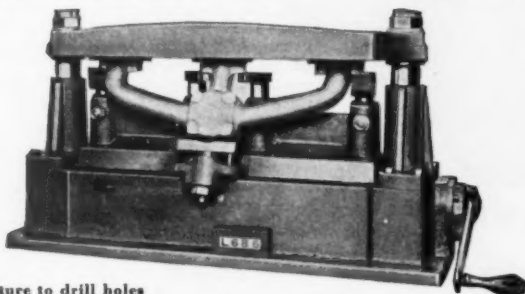
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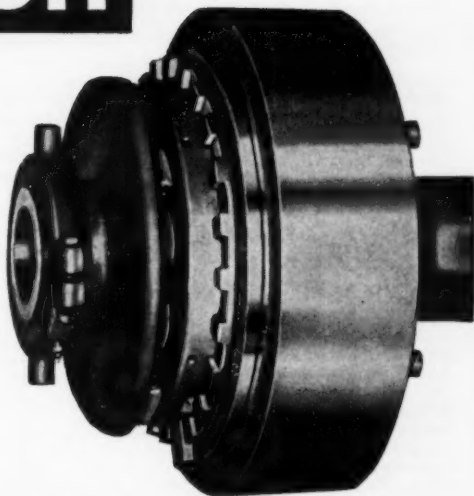
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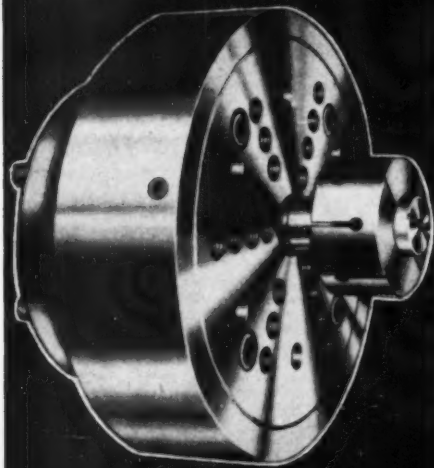
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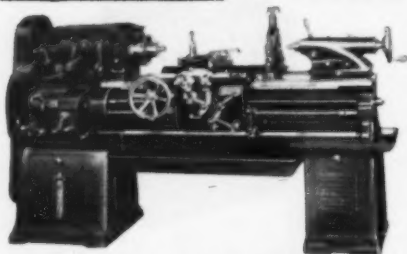
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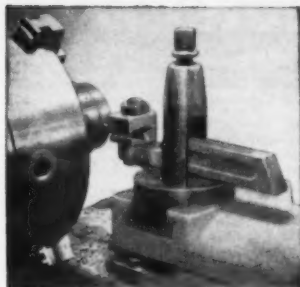
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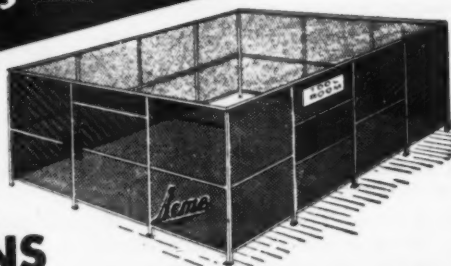
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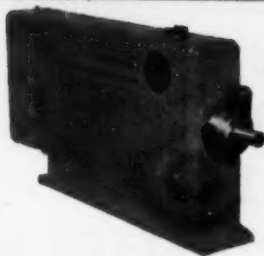
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
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

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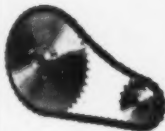


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